

2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09)

Full-scale Methodology Report

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Executive Summary

The 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), conducted for the U.S. Department of Education's National Center for Education Statistics, collected information about students' education and employment in the 6 years since they first enrolled in postsecondary education.

This report describes the methodology and findings of the BPS:04/09 data collection, which included a student interview, a transcript data collection, and an administrative records match.

Sample Design

The target population¹ for the BPS:04/09 study was first-time beginners (FTBs): students who started their postsecondary education for the first time during the 2003–04 academic year at any postsecondary institution in the United States or Puerto Rico. All sampled students for the BPS:04 cohort were FTBs who were eligible for the 2003–04 National Postsecondary Student Aid Study (NPSAS:04) and whose FTB status was confirmed in BPS:04/06, the first follow-up interview.

The BPS:04/09 sample comprised all 18,640 students determined to be eligible during BPS:04/06. At the conclusion of the BPS:04/09 data collection, 16,680 had enough data from the student interview or from administrative sources to be classified as BPS:04/09 study respondents. A BPS:04/09 study respondent was defined as any sample member who was determined to be eligible for the study, was still alive at the time of the BPS:04/09 data collection, and had the requisite valid data from any source to allow construction of his or her enrollment history.

Data Collection

The data collection design for BPS:04/09 involved several stages. The initial process of locating sample members involved batch-locating activities to update sample members' address and telephone information from several sources. In addition, sample members and their parents were sent an initial mailing to collect updated contact information.

Once the initial round of locating was completed, sample members were sent information regarding study participation and informed consent. Data collection then began and was conducted in three phases. Sample members who completed interviews during the early response phase, or first phase, and the nonresponse conversion phase, or last phase, were offered an incentive of \$30. Sample members who completed interviews during the production, or middle phase, were offered an incentive of \$20. First follow-up (BPS:04/06) student interview nonrespondents were offered an additional \$20 during each phase of data collection.

Of the 18,610 sample members in the BPS:04/09 student interview data collection (cases found deceased before data collection were excluded), 16,920 (91 percent) were successfully located, and 15,160 either partially or fully completed an interview. The response rate was 82 percent among the eligible sample and was 90 percent among those sample members who were successfully located. The majority of completed interviews (9,630) were obtained in web mode, wherein respondents accessed and completed the interview online.

¹ The target population consists of all institutions or students in the survey population, and is the population to which inferences are made.

The BPS:04/09 student interview was designed as a web-based instrument to be used for web, telephone, and field respondents. This design required that several important features be embedded in the instrument, such as extensive help text to assist respondents and warnings to alert them when a response fell outside a predetermined range of likely responses.

The BPS:04/09 interview took approximately 20 minutes to complete. On average, web respondents completed the interview in 19.4 minutes, telephone respondents completed the interview in 20.2 minutes, and field respondents completed the interview in 19.6 minutes.

An evaluation of the quality of the data provided by the BPS:04/09 student interview showed that methodological features, such as help text and conversion text built into the instrument and training and supervision of interviewing staff, aided in the successful administration of the interview.

Data collection quality control (QC) procedures for the student interview included frequent monitoring of telephone interviewers, a help desk that tracked and resolved difficulties encountered by sample members attempting to complete the web interview, and quality circle meetings and a debriefing for interviewers and tracers. Feedback from these procedures provided useful information for consideration when planning future administrations of BPS.

Transcripts

Postsecondary transcripts were collected as part of BPS:04/09. Transcripts were requested from all postsecondary institutions attended between July 1, 2003 and June 30, 2009 by members of the BPS:04 cohort. The BPS:04/09 transcript collection was combined with the transcript collection for the 2008/09 Baccalaureate and Beyond Longitudinal Study under the 2009 Postsecondary Education Transcript Study (PETS:09) to ease burden on institutions by sending institution staff a single request for transcripts which included sample members from both studies.

Transcripts were requested from 3,030 eligible postsecondary institutions attended by sample members. This included institutions reported by sample members in the first follow-up (BPS:04/06) and second follow-up (BPS:04/09) student interviews as well as those identified on other transcripts received for sample members. Of the eligible institutions, 2,620 (87 percent) provided transcripts for the cohort. Many transcript submission methods were available to institutions, including several secure electronic methods, fax, and FedEx. Information and instructions were available on a study website and institution contacting staff was also available to assist institution staff with transcript submissions and questions about the study.

Transcript based data were created through a specially-designed keying and coding system (KCS) and a staff of trained keyer/coders. The KCS was divided into sections based upon the categories of data found on transcripts, including case information, schools and terms, academics, tests, degrees and majors, and courses. A PETS coder was developed for the coding of courses by combining the 2010 NCES Classification of Instructional Programs (CIP) and the 2003 College Course Map (CCM).

Keying and coding was performed for 16,960 sample members (92 percent) on a total of 25,120 transcripts. A series of quality control procedures were in place for keying and coding, including key-rekey and expert coder procedures to assess interrater reliability and upcoding procedures for uncodeable data and data entered as “other, specify.” Statistics were calculated to assess interrater reliability for multiple transcript data elements and all indicated substantial agreement between coders.

Analysis Weights

Study respondents for BPS:04/09 were sample members with either BPS:04/09 interview data or enrollment data from administrative databases or transcript data. Weights were constructed for use in the analysis of the three types of respondents: BPS:04/09 study respondents, panel respondents (i.e., study respondents to all three of NPSAS:04, BPS:04/06, and BPS:04/09), and BPS:04/09 sample members with transcript data. The three analysis weights were derived from the BPS:04/06 analysis weights; they were adjusted for nonresponse and calibrated to the sums of the BPS:04/06 weights.

Variance Estimation

Because the BPS:04/09 sample was obtained using a complex sample design that included stratification and clustering, special techniques were needed for variance estimates. Variables were constructed and provided on the data file for bootstrap variance estimation and for Taylor series variance estimation.

Data Dissemination

The data files for BPS:04/09 contain student-level data collected from student interviews and transcripts, government databases, and administrative databases. These files are available as a set of restricted research files fully documented by an electronic codebook (ECB) and through the National Center for Education Statistics' online application PowerStats, which also contains variable documentation. The editing and documentation processes for each file are described in this report.

Foreword

This report describes and evaluates the methods and procedures used in the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09). BPS:04/09 is the second and final follow-up interview for the cohort of first-time beginning postsecondary students identified in the 2004 National Postsecondary Student Aid Study. For the first time in BPS, in addition to the student interview, transcripts were collected from all of the postsecondary institutions attended by the sample. Together, the student interview and transcript data collections represent a significant and rich data source on this cohort of first-time beginning students.

We hope that the information provided in this report will be useful to interested readers. Additional information about BPS:04/09 is available on the Web at <http://www.nces.ed.gov/surveys/bps>.

Tom Weko
Associate Commissioner
Postsecondary, Adult, and Career Education Division

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We gratefully acknowledge the assistance of the staff members at postsecondary institutions who provided data for the student and transcript data collections. Special thanks is also extended to members of the Technical Review Panel who provided their expertise to help shape BPS:04/09.

Contents

Executive Summary	iii
Foreword	vii
Acknowledgments	ix
List of Tables	xv
List of Figures	xix
Chapter 1. Overview	1
1.1 Background and Objectives of BPS	1
1.2 Addition of Transcript Component	3
1.3 Schedule and Products of BPS:04/09	3
Chapter 2. Sampling	5
2.1 Target Population	5
2.1.1 Institution Universe for NPSAS:04	5
2.1.2 Student Universe for NPSAS:04	5
2.2 Base-Year Study (NPSAS:04)	6
2.2.1 Institution Sample for NPSAS:04	6
2.2.2 Student Sample for NPSAS:04	7
2.3 First Follow-up Study (BPS:04/06)	9
2.4 Second Follow-up Study (BPS:04/09)	11
2.5 BPS:04 Cohort Study Respondent	12
Chapter 3. Student Interview Design, Data Collection, Outcomes, and Evaluation	13
3.1 Student Interview Design and Systems	13
3.1.1 Student Interview Design	13
3.1.2 Data Collection Systems	16
3.2 Student Interview Data Collection	18
3.2.1 Training of Interview Data Collection Staff	18
3.2.2 Study Website	19
3.2.3 Locating and Contacting Sample Members	20
3.2.4 Interviewing	24
3.2.5 Other Procedures to Maximize Locating and Interview Response	27
3.3 Data Collection Quality Control	28
3.3.1 Interview Monitoring	28
3.3.2 Help Desk	29
3.3.3 Quality Circle Meetings	30
3.3.4 Debriefing	30
3.4 Student Interview Data Collection Outcomes	30
3.4.1 Student Interview Response Rates	31
3.4.2 Interview Timing Burden	39
3.4.3 Telephone Interviewer Hours	41
3.4.4 Number of Calls to Sample Members	41
3.5 Evaluation of Student Interview Items	42

3.5.1	Instrument Coders	42
3.5.2	Help Text.....	44
3.5.3	Conversion Text.....	44
3.5.4	Item Nonresponse	46
3.6	Student Interview Conclusions	48
Chapter 4.	Transcript Data Collection, Outcomes, and Evaluation.....	51
4.1	Transcript Data Collection and Response Rates.....	51
4.1.1	Transcript Control System.....	51
4.1.2	Training of Institution Contacting Staff	51
4.1.3	Transcript Collection Procedures	52
4.1.4	Institution Website.....	54
4.1.5	Transcript Collection Response Rates	56
4.2	Transcript Keying and Coding.....	58
4.2.1	Transcript Keying and Coding Procedures	58
4.2.2	Training of Transcript Keyer/Coder Staff.....	61
4.2.3	Transcript Keying and Coding Outcomes.....	61
4.2.4	Evaluation of Transcript Keying and Coding.....	62
4.3	Timing of Transcript Keying and Coding.....	67
4.4	Transcript Data Collection Conclusions	68
Chapter 5.	Post-Data Collection Data File Processing Activities.....	69
5.1	Administrative Record Matching.....	69
5.1.1	Central Processing System	69
5.1.2	National Student Loan Data System	70
5.1.3	National Student Clearinghouse.....	70
5.2	BPS:04/09 Main Study Data Files.....	71
5.3	Transcript Data Files.....	72
5.4	Data Editing.....	74
5.5	Data Perturbation	75
5.6	Statistical Imputations	75
5.7	Composite and Derived Variable Construction	77
Chapter 6.	Weighting and Variance Estimation	79
6.1	Analysis Weights	79
6.1.1	Analysis Weights for BPS:04/09 Study Respondents.....	79
6.1.2	Analysis Weights for Study Respondents to NPSAS:04, BPS:04/06, and BPS:04/09 (Longitudinal or Panel weight).....	94
6.1.3	Analysis Weights for Cases with Transcript Data	107
6.2	Variance Estimation	120
6.2.1	Taylor Series.....	120
6.2.2	Bootstrap Replicate Weights	124
6.3	Overall Weighted and Unweighted Response Rates	125
6.4	Accuracy of Estimates.....	128
6.4.1	Measures of Precision: Standard Errors and Design Effects	128
6.4.2	Measure of Bias	129

References.....	139
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Appendixes

A. NPSAS:04 Institution and Student Sampling Details.....	A-1
B. Technical Review Panel.....	B-1
C. Data Elements for Student Interview	C-1
D. Facsimile of Full-scale Instrument.....	D-1
E. Training Material for Interviewers.....	E-1
F. Notification Materials for Student Interview Data Collection	F-1
G. Training Agendas for Transcript Data Collection	G-1
H. Notification Materials for Transcript Data Collection.....	H-1
I. Data Elements for Keying and Coding System	I-1
J. Item Response Rates and Imputation Results	J-1
K. Analysis Variables	K-1
L. Design Effects	L-1
M. Nonresponse Bias Analysis.....	M-1

List of Tables

1.	Schedule of major activities: 2007–10	3
2.	Data products: 2010–11	4
3.	NPSAS:04 institution sample sizes and yield, by institution type: 2004.....	7
4.	Numbers of NPSAS:04 sampled and eligible students and response rates, by institution type and student type: 2004	9
5.	BPS:04/09 sample size, by response status to prior-round interviews: 2009.....	12
6.	Training of interview data collection staff: 2009	18
7.	Batch processing record match rates, by tracing source: 2009	23
8.	Cases requiring intensive tracing, by first follow-up response status and institution type: 2009.....	24
9.	Help desk requests, by type of incident reported: 2009.....	29
10.	Locating and participation rates, by first follow-up response status and NPSAS institution type: 2009.....	32
11.	Completed interviews, by first follow-up response status and interview type: 2009	33
12.	Number of cases and percentage of completed interviews within each phase of data collection: 2009.....	34
13.	Located and interview completion rates, by source of address update: 2009	35
14.	Located and interviewed rates of cases requiring intensive tracing, by intensive tracing method: 2009	35
15.	Locate rates, by other locating methods: 2009.....	36
16.	Located and completed field interview cases, by first follow-up response status and institution type: 2009	38
17.	Average time in minutes to complete interview section, by mode of administration: 2009.....	40
18.	Average time in minutes to complete enrollment sections, by number of schools attended: 2009.....	40
19.	Average time in minutes to complete abbreviated interview, by interview section and mode of administration: 2009	41
20.	Average number of calls, by response status and data collection phase: 2009.....	42
21.	Summary of recoding results, by coder type and administration mode: 2009	43
22.	Summary of upcoding results, by coding system and administration mode: 2009.....	43
23.	Interview questions with highest rates of help text access, by administration mode: 2009	44
24.	Conversion rates for critical items, by mode of administration: 2009.....	46
25.	Interview items with highest nonresponse rates, by mode of administration: 2009	48

List of Tables

26.	Eligible institution participation, by institution type: 2009	56
27.	Institution transmission mode for transcript data: 2009	57
28.	Student-level transcript collection results: 2009.....	57
29.	Upcoding of "other, specify" data: 2009.....	67
30.	Average minutes per transcript, by institution control and level: 2009.....	68
31.	Central Processing System matching results, by academic year: 2007–10	69
32.	National Student Load Data System matching results, by loan and grant type: 2009	70
33.	National Student Clearinghouse StudentTracker matching results: 2009.....	70
34.	Description of missing data codes: 2009	74
35.	Weight adjustment factors for nonresponse for the BPS:04/09 study weights: 2009	82
36.	Control totals, weight adjustment factors, and sum of weights for eligible cases for the BPS:04/09 study weight raking adjustment: 2009.....	89
37.	Weight distribution and unequal weighting effects for the BPS:04/09 study weight (WTA000), by type of institution: 2009.....	93
38.	Weight adjustment factors for nonresponse for the BPS:04/09 longitudinal (panel) weights: 2009.....	96
39.	Control totals and sums of weights for eligible cases for the BPS:04/09 panel weight raking adjustment: 2009	103
40.	Weight distribution and unequal weighting effects for the NPSAS:04 - BPS:04/06 - BPS:04/09 longitudinal study weight, by type of institution: 2009.....	106
41.	Weight adjustment factors for nonresponse for the BPS:04/09 student transcript weight: 2009	109
42.	Control totals and sums of weights for eligible cases for the BPS:04/09 student transcript weight raking: 2009.....	116
43.	Weight distribution and unequal weighting effects for the BPS:04/09 student transcript weight, by type of institution: 2009.....	119
44.	Use of analysis weights, replicate weights, and variance estimation strata and primary sampling unit (PSU) variables available from BPS:04/09 in selected survey data analysis software: 2009.....	123
45.	Unweighted and weighted NPSAS:04 institution response rates and BPS:04/09 student study, interview, panel, and transcript response rates, by type of institution: 2009	126
46.	Summary of student study nonresponse bias before and after weight adjustments, by type of institution: 2009	132
47.	Summary of student nonresponse bias for interview respondents when analyzed using the study weight, by type of institution: 2009	134

48.	Summary of student NPSAS:04-BPS:04/06-BPS:04/09 nonresponse bias, by type of institution: 2009.....	135
49.	Summary of student transcript nonresponse bias, by type of institution: 2009.....	136

List of Figures

1.	Chronology of BPS: 1990–2009.....	2
2.	Distribution of BPS:04/06 sample, by base-year response status: 2004.....	11
3.	Evolution of BPS:04 cohort: 2009.....	12
4.	Interview sections and topics: 2009.....	14
5.	BPS:04/09 website home page: 2009.....	20
6.	Locating methods: 2009.....	21
7.	Data collection phases: 2009.....	25
8.	Overall locating and interviewing results: 2009.....	31
9.	Percentage of completed interviews, by mode of administration: 2009.....	33
10.	Percentage of completed interviews, by data collection phase: 2009.....	34
11.	Interview completion rates, by timing of text messages: 2009.....	36
12.	Early response rates for first follow-up interview nonrespondents who were prompted: 2009.....	37
13.	Institution website home page: 2009.....	55
14.	Keying and coding system sections: 2009.....	58
15.	CIP code diagram: 2009.....	59
16.	Course codes layout in the KCS coders: 2009.....	60
17.	Course coding results: 2009.....	62
18.	Rekey kappa values, by transcript section: 2009.....	63
19.	Expert coding results, kappa by level of specificity: 2009.....	64
20.	Major/field of study upcoding: 2009.....	65
21.	Institution IPEDS upcoding: 2009.....	66
22.	Receiver operating characteristics (ROC) curve for BPS:04/09 study response propensity: 2009.....	94
23.	Receiver operating characteristics (ROC) curve for NPSAS:04 - BPS:04/06 - BPS:04/09 longitudinal study response propensity: 2009.....	107
24.	Receiver operating characteristics (ROC) curve for BPS:04/09 transcript response propensity: 2009.....	120

Chapter 1.

Overview

This report documents the methodological procedures and data quality evaluations of the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09). RTI International,* with the assistance of MPR Associates, Inc., conducted the BPS:04/09 study for the National Center for Education Statistics (NCES) of the U.S. Department of Education (under Contract No. ED-02-CO-0011).

Chapter 1 describes the background, legislative authorization, and schedule and products of BPS:04/09, as well as the major design changes from previous BPS studies. Chapter 2 presents the sampling details of the BPS:04 cohort and provides the definition of a BPS:04 cohort study respondent. Chapter 3 describes the development of the student interview and details of the data collection and results and provides an evaluation of the student interview data quality. Chapter 4 describes the transcript data collection, including systems for collecting, recording, and evaluating transcript data. Chapter 5 summarizes the file preparation process for the BPS:04/09 student interview and transcript data collections. Finally, chapter 6 provides information pertaining to the weighting and variance estimation procedures for BPS:04/09. Materials used during the full-scale student interview and transcript data collection are appended to the report and cited in the text where appropriate.

Throughout this document, reported numbers of sample institutions and students have been rounded to ensure the confidentiality of individual student data. As a result, row and column entries in tables may not sum to their respective totals, and reported percentages may differ somewhat from those that would result from these rounded numbers.

1.1 Background and Objectives of BPS

BPS is one of several NCES-sponsored studies developed to address the need for nationally representative data on key postsecondary education issues. BPS cohorts include first-time beginners (FTBs) in postsecondary schools who are surveyed at three points in time: in their first year in the National Postsecondary Student Aid Study (NPSAS), and then three and six years after first starting in postsecondary education in the BPS follow-up surveys. BPS collects data on a variety of topics, including student demographic characteristics, school and work experiences, persistence, transfer, and degree attainment. Previous cycles of NPSAS, as well as BPS, are authorized by the following legislation:

- the Higher Education Act of 1965, as amended by the Higher Education Opportunity Act of 2008, 20 U.S.C. § 1015a(k) (2010);
- the General Education Provisions Act, as amended, 20 U.S.C. §§ 9541 to 9548 (2007);
- the National Education Statistics Act of 1994, as amended, 20 U.S.C. §§ 9541 to 9547 and 9573 (2007).

Figure 1 shows the data collection timeline for the base-year and subsequent follow-up studies for each BPS study in the series.

* RTI International is a trade name of Research Triangle Institute.

Figure 1. Chronology of BPS: 1990–2009

Academic year	Cohort		
	BPS:1990	BPS:1996	BPS:2004
Year 1	1989–90 (NPSAS:90)	1995–96 (NPSAS:96)	2003–04 (NPSAS:04)
Year 2			
Year 3	1991–92 (BPS:90/92)	1997–98 (BPS:96/98)	2005–06 (BPS:04/06)
Year 4			
Year 5	1993–94 (BPS:90/94)		
Year 6		2000–01 (BPS:96/01)	2008–09 (BPS:04/09)

NOTE: NPSAS = National Postsecondary Student Aid Study.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

For the BPS:04 cohort, the first follow-up interview (BPS:04/06) captured the academic progress and persistence in postsecondary education of 2003–04 FTBs in the 3 academic years after their initial entry into a postsecondary institution. Data collected as part of this interview focused on continued education and experience, education financing, entry into the workforce, and the relationship between experiences during postsecondary education and various societal and personal outcomes.

The second follow-up interview for the BPS:04 cohort, BPS:04/09, monitored students' academic progress in the 6 academic years after their first entry into postsecondary education and assessed completion rates with a focus on the bachelor's degree. Data collection continued to focus on education and employment, and the survey included many of the questions used in the first follow-up interview to provide continuity over time. BPS:04/09 also collected detailed information about the transition into employment after bachelor's degree completion and asked questions related to family formation and personal change during this time. See section 3.1.1. Student Interview Design for a description of the contents of the BPS:04/09 student interview.

1.2 Addition of Transcript Component

In addition to the student interview, BPS:04/09 included collection of postsecondary transcripts for the first time. Transcripts and course catalogs were requested from all institutions attended by the BPS:04 cohort since the first year of enrollment in 2003–04. Institutions were identified from interviews with the sample at the three time points—2004, 2006, and 2009—and from transcripts received from those institutions. Once received, the transcripts were keyed and coded using a data entry system specifically designed for postsecondary transcripts. Final raw data files and derived variables were included on the study’s electronic codebook (ECB), and made available through NCES’s online application PowerStats. Tables and regression analyses can be run by any user through PowerStats, which also contains variable documentation. PowerStats is available online via the DataLab site at <http://nces.ed.gov/datalab/index.aspx>.

1.3 Schedule and Products of BPS:04/09

Various activities comprised the student interview and transcript data collections. Table 1 summarizes the schedule for BPS:04/09 student interview and transcript activities.

Table 1. Schedule of major activities: 2007–10

Activity	Start date	End date
Student interview		
Finalize student sample	8/1/2007	9/30/2007
Conduct web and telephone student interview data collection	2/24/2009	9/30/2009
Conduct field student interview data collection	6/22/2009	9/30/2009
Process student interview data; construct data files	2/25/2009	8/27/2010
Transcript		
Collect postsecondary catalogs and transcripts	8/1/2008	3/5/2010
Key and code transcripts	11/2/2008	5/7/2010
Process transcript data	2/2/2009	8/13/2010
Create transcript derived variables	12/1/2009	4/29/2011

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

In addition to this methodology report, BPS:04/09 includes several data products for the BPS:04 cohort which can be found on the NCES website at <http://nces.ed.gov/pubsearch/getpubcats.asp?sid=014>. A First Look report provides a brief description of persistence and degree attainment of the cohort over six academic years. Web tables provide 6-year attainment, persistence, transfer, retention, and withdrawal rates. A Statistical Analysis Report investigates the percentage of students in the cohort who began postsecondary education in degree programs but left without earning any credential, the timing of their departure, their personal and institutional characteristics, and the number of credits they earned prior to departure. Data files contain data collected from student interviews and transcripts, government databases, and administrative databases. These files are available as a set of restricted research files fully documented by an electronic codebook (ECB) and the public-use data are also available through the NCES online application PowerStats, which contains variable documentation and can be accessed at <http://nces.ed.gov/datalab/>. Table 2 provides release dates for BPS:04/09 data products.

Table 2. Data products: 2010–11

BPS data products	Release date
First Look	12/1/2010
Powerstats (student interview)	12/1/2010
ECB (student interview)	3/8/2011
Web tables	7/13/2011
Methodology report	9/30/2011
Statistical Analysis Report	12/31/2011
Powerstats (transcripts)	10/31/2011
ECB (transcripts)	11/30/2011

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Chapter 2. Sampling

The BPS:04 cohort is a sample of first-time beginners (FTBs) first identified in the 2004 National Postsecondary Student Aid Study (NPSAS:04) base-year study and surveyed again in the first follow-up study, the 2004/06 Beginning Postsecondary Students Longitudinal Study (BPS:04/06), and the second follow-up study, the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09). The BPS:04 cohort includes sample members that participated in one or more of the three interviews, as well as BPS:04 cohort study respondents for whom sources other than interviews provided critical information.

2.1 Target Population

The target population (or universe) for the BPS:04 cohort consisted of all students who began their postsecondary education for the first time during the 2003–04 academic year at any postsecondary institution in the United States or Puerto Rico that was eligible for NPSAS:04.

2.1.1 Institution Universe for NPSAS:04

The institutions eligible for NPSAS:04 were required during the 2003–04 academic year to meet all criteria for distributing federal aid authorized under Title IV of the Higher Education Act (20 U.S.C. §§ 1070-1099), including

- offering an educational program designed for persons who have completed a high school education;
- offering at least one academic, occupational, or vocational program of study lasting at least 3 months or 300 clock hours;
- offering courses that are open to persons other than the employees or members of the company or group (e.g., union) that administers the institution; and
- being located in the 50 states, the District of Columbia, or Puerto Rico.

Institutions providing only vocational, recreational, or remedial courses or only in-house courses for their own employees were excluded. U.S. service academies were excluded because of their unique funding/tuition base.

These institution eligibility conditions are consistent with previous NPSAS studies, with two exceptions. First, the criterion of being eligible to distribute Title IV aid was implemented beginning with NPSAS:2000,¹ and second, the previous NPSAS studies excluded institutions that offered only correspondence courses. NPSAS:04 included such institutions if they were eligible to distribute Title IV student aid.

2.1.2 Student Universe for NPSAS:04

Consistent with previous NPSAS studies, the students eligible for NPSAS:04 were those who were enrolled in eligible institutions and who satisfied both of the following eligibility requirements:

¹ An indicator of Title IV eligibility has been added to the analysis files from earlier NPSAS studies to facilitate comparable analyses.

- they were enrolled in either (1) an academic program, (2) at least one course for credit that could be applied toward fulfilling the requirements for an academic degree, or (3) an occupational or vocational program that required at least 3 months or 300 clock hours of instruction to receive a degree, certificate, or other formal award; and
- they were not concurrently or solely enrolled in high school or in a General Educational Development (GED) program or other high school completion program.

2.2 Base-Year Study (NPSAS:04)

The sampling design for NPSAS:04, the base year study for BPS, was a two-stage design in which eligible institutions were selected in the first stage and eligible students, within eligible responding sample institutions, were selected in the second stage. The NPSAS:04 sampling process and first follow-up (BPS:04/06) subsampling procedures are described in the following subsection. For detailed information on the NPSAS:04 sample allocation and statistical design formulas, see appendix A.

2.2.1 Institution Sample for NPSAS:04

The institution sampling frame for NPSAS:04 was constructed from the 2000–01 and 2001–02 Integrated Postsecondary Education Data System (IPEDS) Institutional Characteristics files and header files, and the 2000 and 2001 Fall Enrollment files. The sample of institutions was freshened using the 2002–03 IPEDS to include a sample of newly formed institutions. Records on the IPEDS files for NPSAS-ineligible institutions were deleted. NPSAS-ineligible institutions included U.S. service academies, institutions located outside the United States and Puerto Rico, and institutions offering no programs of study lasting at least 3 months or 300 clock hours. The IPEDS files were cleaned to resolve any of the following types of problems:

- missing enrollment data,² because these data are needed to compute measures of size for sample selection; and
- unusually large or small enrollment, especially if imputed, because, if incorrect, these data would result in inappropriate probabilities of selection and sample allocation.

The institutions with cleaned data were then included in the sampling frame, and a direct, unclustered sample of institutions was selected for NPSAS:04.³ As a part of this sample, to allow for analysis of the effects of state tuition and student aid policies in individual states, the number of institutions in 12 specific states was oversampled from three institution types—public 2-year institutions, public 4-year institutions, and private nonprofit 4-year institutions—in each of the following 12 states: California, Connecticut, Delaware, Georgia, Illinois, Indiana, Minnesota, Nebraska, New York, Oregon, Tennessee, and Texas. These 12 states were chosen from a set of volunteering states that expressed interest in and a willingness to support and encourage participation in NPSAS by their institutions.

² Missing IPEDS enrollment data had been previously imputed for most, but not all, of the NPSAS:04 institutions. This step filled in missing data for any remaining institutions.

³ A direct unclustered sample of institutions was also selected in NPSAS:96. Prior to NPSAS:96, a clustered sample of institutions was selected for the study.

Table 3 presents the allocation of the NPSAS:04 institution sample by institution type. The number of sampled institutions was 1,670, of which 1,630 were eligible.⁴ Of the 1,630 eligible institutions, 1,360 (84 percent) provided student enrollment lists.

Table 3. NPSAS:04 institution sample sizes and yield, by institution type: 2004

Institution type	Sampled institutions	Eligible institutions	Eligible institutions that provided enrollment lists		
			Number	Unweighted percent	Weighted percent
Total	1,670	1,630	1,360	83.5	80.0
Public					
Less-than-2-year	70	60	50	76.6	74.3
2-year	380	380	320	85.4	77.6
4-year non-doctorate-granting	130	130	110	85.1	70.3
4-year doctorate-granting	230	230	200	86.3	87.1
Private nonprofit					
2-year or less	70	70	70	89.0	92.6
4-year non-doctorate-granting	280	270	220	81.9	78.1
4-year doctorate-granting	220	220	170	77.7	80.8
Private for-profit					
Less-than-2-year	170	160	140	84.0	82.3
2 years or more	110	110	90	84.4	88.2

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003–04 National Postsecondary Student Aid Study (NPSAS:04).

2.2.2 Student Sample for NPSAS:04

The NPSAS:04 student sampling design was based on fixed-type sampling rates, rather than fixed-type sample sizes, to keep the probabilities of selection equal across student type within the institution type. The NPSAS:04 sampling design used

- two student sampling types for undergraduates (one for FTBs, and one for all other undergraduates);
- one type for first-professional students; and
- three student sampling types for graduate students (master's, doctoral, and "other" graduate students).⁵

The identification of an adequate number of FTBs for the NPSAS:04 sample was critical for preparing the first follow-up (BPS:04/06) sample. For the NPSAS:04 sampling frame, students who were thought to be FTBs based on an FTB indicator provided by sampled institutions on their student enrollment lists were classified as *potential* FTBs. NPSAS-eligible students who enrolled in a postsecondary institution during the NPSAS year (July 1, 2003, through June 30, 2004) for the first

⁴ Among the ineligible institutions, approximately one-third closed after the sampling frame was defined, one-third failed to meet one or more of the NPSAS criteria for institution eligibility, and the remaining one-third had enrollment lists that were combined with eligible institutions because of an affiliation between the campuses.

⁵ Differential sampling rates were used for the three types of graduate students to achieve adequate representation of students pursuing doctoral degrees and to limit the sample size for "other" graduate students, who are of limited inferential interest.

time after completing high school requirements were considered *pure* FTBs. Those NPSAS-eligible students who had enrolled for at least one postsecondary course before the 2003–04 NPSAS year but never completed that course were considered *effective* FTBs. Potential FTBs included both *pure* and *effective* FTBs.

Samples from previous NPSAS studies provide evidence that postsecondary institutions are sometimes unable to accurately identify their FTBs. The false-positive and false-negative FTB rates experienced in NPSAS:96 were used to set appropriate FTB sampling rates for NPSAS:04.⁶

A total of 109,210 students were selected for the NPSAS:04 student sample from among the various institution types in the institution sample. The student sample included 49,410 potential FTBs, 47,680 non-FTB or “other” undergraduate students, and 12,120 graduate and first-professional students.

Various sources were used to verify eligibility of the NPSAS:04 student sample, including an institution record abstraction (computer-assisted data entry [CADE]), the NPSAS:04 student interview, and record matching against several administrative databases (e.g., the U.S. Department of Education’s Central Processing System [CPS]). Of the 109,210 sampled students, 101,010 were found to be eligible for NPSAS:04. Ineligible students were identified during the student interview or from institutional records if student eligibility was not determined from a student interview.

NPSAS:04 study respondents were those sample members for whom key pieces of data were obtained from one or more of the study sources. Students could be NPSAS:04 study respondents without completing the student instrument. Ninety percent of the eligible sample were considered study respondents. For more information about the NPSAS:04 study respondent definition and the NPSAS:04 sample, see the NPSAS:04 Full-Scale Methodology Report (Cominole et al., 2006). Table 4 shows numbers of NPSAS:04 sampled and eligible students as well as response rates, by institution type and student type.

⁶ The NPSAS:96 false-positive rate was 27.6 percent for students who were identified as potential FTBs by the sample institutions but later were determined not to be FTBs. The false-negative rate was 9.1 percent for those students who were not identified as potential FTBs by the sample institutions but later were determined to be FTBs.

Table 4. Numbers of NPSAS:04 sampled and eligible students and response rates, by institution type and student type: 2004

Institution type and student type	Sampled students	Eligible students	Study respondents ¹	
			Unweighted percent	Weighted percent
All students	109,210	101,010	89.8	91.0
Institution type				
Public				
Less-than-2-year	3,180	2,580	84.2	90.6
2-year	36,300	32,450	81.3	83.9
4-year non-doctorate-granting	9,200	8,880	91.9	93.3
4-year doctorate-granting	22,350	21,620	93.7	94.2
Private nonprofit				
Less-than-4-year	3,060	2,770	94.3	94.6
4-year non-doctorate-granting	9,740	9,300	96.3	96.9
4-year doctorate-granting	9,930	9,590	94.5	95.4
Private for-profit				
Less-than-2-year	9,270	8,030	94.9	94.3
2 years or more	6,190	5,790	95.0	96.7
Student type				
Total undergraduates	97,090	89,480	89.3	90.3
Potential FTB	49,410	44,670	91.2	91.4
Other undergraduates	47,680	44,810	87.3	90.0
Graduate/first-professional	12,120	11,530	94.2	95.1

¹ A study respondent is defined as any eligible student for whom sufficient data were obtained from one or more sources, including student interview, institutional records, and other administrative data sources.

NOTE: Detail may not sum to totals because of rounding. FTB = first-time beginner.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003–04 National Postsecondary Student Aid Study (NPSAS:04).

2.3 First Follow-up Study (BPS:04/06)

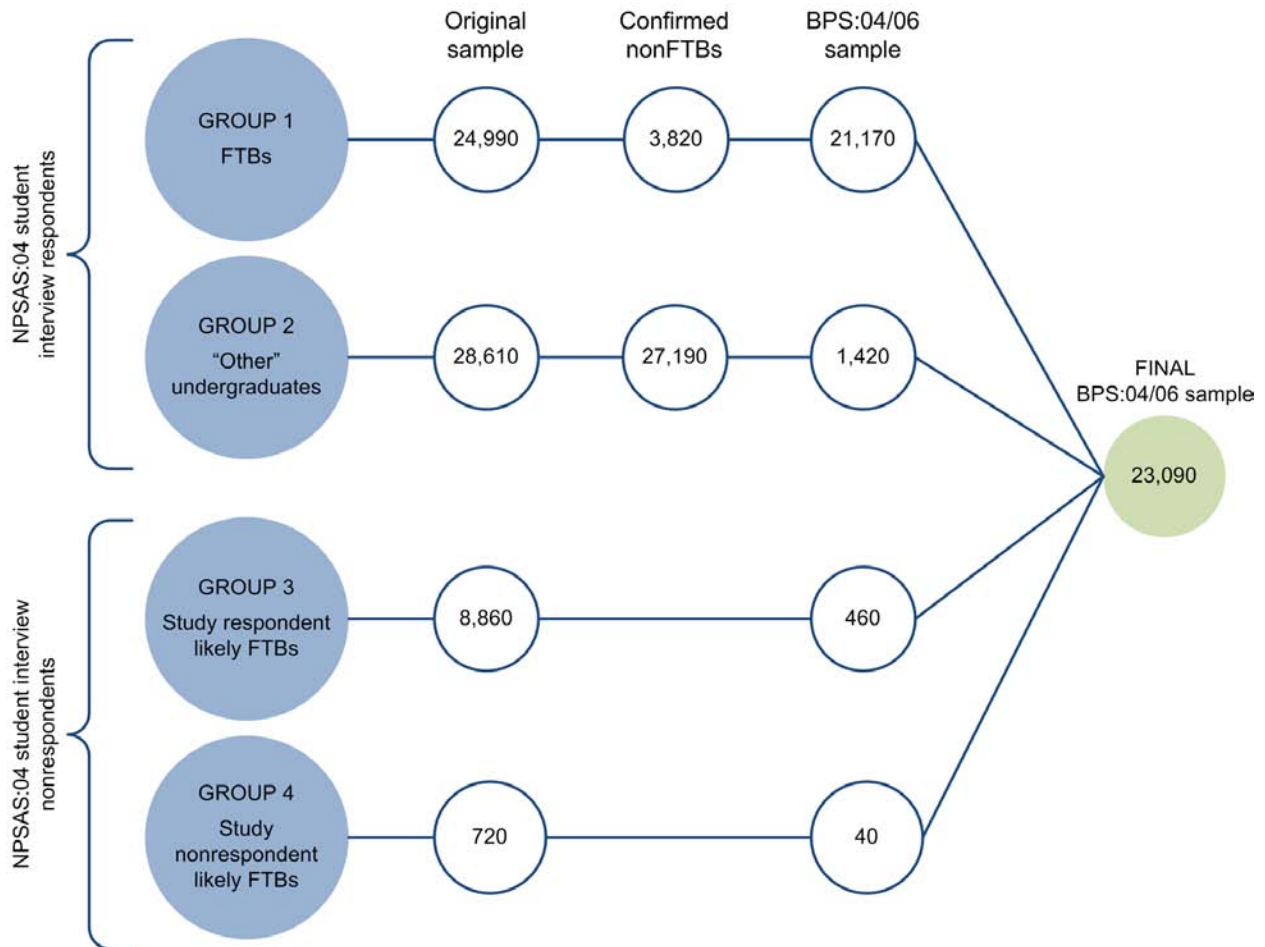
To construct the frame for the first follow-up (BPS:04/06) sample, multiple data sources containing information—such as a student’s year of high school graduation, undergraduate class level, and dates of receipt of any loans—were used to estimate or confirm a student’s likelihood of being an FTB during the NPSAS year. These data sources included

- the base-year student interview (NPSAS:04);
- student-level data obtained from institutional records via CADE;
- the CPS, which contains data provided to the U.S. Department of Education by students and their families when they complete the Free Application for Federal Student Aid (FAFSA); and
- the U.S. Department of Education’s National Student Loan Data System (NSLDS), which contains Pell Grant and Stafford Loan information.

Using these indicators, a set of decision rules was developed to identify which cases had enough information confirming their FTB status to be included in the first follow-up sample. The first follow-up sample included 23,090 FTBs, identified as follows:

1. **FTBs.** Approximately 24,990 students responding to the base-year (NPSAS:04) student interview indicated that they were FTBs during the 2003–04 academic year. Approximately 3,820 of these students were identified for exclusion from the first follow-up (BPS:04/06) sample when the multiple data sources confirmed that they could not have been FTBs during the NPSAS year. Of the approximately 21,170 included in the first follow-up sample, approximately 19,800 had other data that strongly supported their FTB status, and approximately 1,370 of these students had some indications that they were not FTBs; these potential *false positives* were rescreened during the first follow-up interview to confirm their status.
2. **“Other” undergraduates (false-negative FTBs).** Approximately 1,420 students were not originally classified as FTBs and were part of the base-year (NPSAS:04) group of 28,610 “other” undergraduates but were later identified as potential FTBs based on either CPS data or because they had a high school graduation date in 2003 or 2004; these 1,420 potential *false negatives* were included in the first follow-up (BPS:04/06) sample and rescreened during the first follow-up interview to verify their status.
3. **Study respondents likely FTBs.** Approximately 8,860 students did not respond to the base-year (NPSAS:04) student interview but were classified as NPSAS:04 study respondents and were potential FTBs based on CADE, CPS, and loan data. Because student interview nonrespondents tend to have different demographic characteristics than interview respondents, approximately 460 of these 8,860 NPSAS:04 student interview nonrespondents were included in the first follow-up (BPS:04/06) sample to reduce nonresponse bias. Two factors, stratification by tracing outcome and the likelihood of being an FTB, were used to sample the 460 students most likely to be located and eligible for the study.
4. **Study nonrespondents likely FTBs.** Approximately 720 base-year (NPSAS:04) sample members were potential FTBs based on information from CADE or CPS but did not respond to the base-year student interview and did not have sufficient data to be classified as study respondents. Of these 720 students, a subsample of approximately 40 was included in the first follow-up (BPS:04/06) sample based on the same criteria (likelihood of eligibility and of being located) as the subsample in group 3.

A visual representation of the distribution of the first follow-up (BPS:04/06) sample, by base-year response status, is shown in figure 2.

Figure 2. Distribution of BPS:04/06 sample, by base-year response status: 2004

NOTE: A study respondent is defined as any eligible student for whom sufficient data were obtained from one or more sources, including institutional records and other administrative data sources. Detail may not sum to totals because of rounding. FTB = first-time beginner.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003–04 National Postsecondary Student Aid Study (NPSAS:04) and 2004/06 Beginning Postsecondary Students Longitudinal Study (BPS:04/06).

2.4 Second Follow-up Study (BPS:04/09)

The first follow-up (BPS:04/06) starting sample consisted of 23,090 students. Over the course of the first follow-up data collection, 4,450 ineligible cases were removed from the sample based on the following:

- responses to eligibility questions in the first follow-up student interview;
- logistic modeling done using NSLDS and CPS data to predict the eligibility status of first follow-up interview nonrespondents; and
- review of sample member eligibility information against updated National Student Clearinghouse (NSC) data.

As a result of these procedures, the total second follow-up (BPS:04/09) sample was cleaned to remove the 4,450 ineligible cases and thereby reduced from 23,090 to 18,640 cases. Table 5 shows the distribution of the second follow-up sample by prior-round response status (i.e., whether the

student responded to the base year, NPSAS:04 interview, and the first follow-up, BPS:04/06 interview).

Table 5. BPS:04/09 sample size, by response status to prior-round interviews: 2009

NPSAS:04 study respondent ¹	NPSAS:04 interview respondent	BPS:04/06 interview respondent	BPS:04/09 sample
Total			18,640
Yes	Yes	Yes	14,750
Yes	Yes	No	3,510
Yes	No	Yes	140
Yes	No	No	220
No	No	Yes	10
No	No	No	20

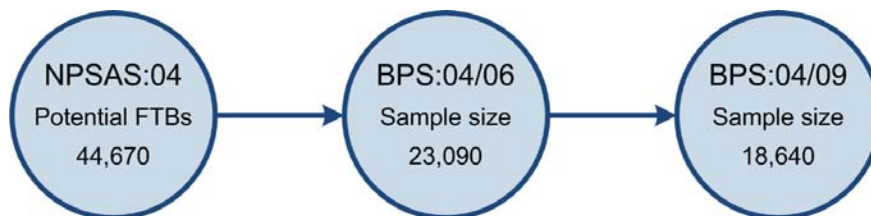
¹ A study respondent is defined as any eligible student for whom sufficient data were obtained from one or more sources, including institutional records and other administrative data sources.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003–04 National Postsecondary Student Aid Study (NPSAS:04), 2004/06 Beginning Postsecondary Students Longitudinal Study (BPS:04/06), and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Figure 3 shows the evolution of the BPS:04 cohort.

Figure 3. Evolution of BPS:04 cohort: 2009



NOTE: FTBs = first-time beginners. NPSAS:04 = 2003–04 National Postsecondary Student Aid Study (NPSAS:04).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

2.5 BPS:04 Cohort Study Respondent

In addition to the BPS:04/09 student interview, student-level data for BPS:04/09 were collected from a variety of administrative sources, including the NSC StudentTracker and NSLDS files. Data from these other sources supplemented interview data and allowed enrollment histories and persistence and attainment variables to be constructed for a proportion of interview nonrespondents.

A BPS:04/09 study respondent was defined as any sample member who was determined to be eligible for the study, was still alive at the time of the BPS:04/09 data collection, and had the requisite valid data from any source to allow construction of his or her enrollment history.

Of the 18,640 cases included in the BPS:04/09 data collection, 110 were found to be deceased at the conclusion of data collection and removed from the sample, 15,160 were classified as study respondents on the basis of having completed a BPS:04/09 student interview, and 1,520 were classified as BPS:04/09 study respondents because sufficient enrollment information about their postsecondary experience could be gathered from the NSC StudentTracker and NSLDS files.

Chapter 3.

Student Interview Design, Data Collection, Outcomes, and Evaluation

The 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09), was designed for web, telephone, and field administration and included an abbreviated Spanish interview. Sample members were primarily located using batch address and phone sources and were asked to complete the student interview between February and October 2009. Analyses and evaluation of data collection provided information for consideration when planning future administrations of BPS.

3.1 Student Interview Design and Systems

The second follow-up interview (BPS:04/09) consisted of four sections, Enrollment History, Enrollment Characteristics, Employment, and Background, which were also in the first follow-up (BPS:04/06) student interview. Based on review of the relevance of specific interview topics, question wording and section structure were sometimes altered for the second follow-up interview. A Spanish interview in web mode was also added. This section provides the details of the second follow-up student interview design and systems.

3.1.1 Student Interview Design

The content of the second follow-up (BPS:04/09) interview remained largely the same as that in prior BPS second follow-up interviews (BPS:90/94 and BPS:96/01), building on data elements developed with input from the study's Technical Review Panel (TRP) and from the National Center for Education Statistics (NCES). (For a list of TRP members, see appendix B.); As described in the BPS:04/09 Field Test Working Paper (Wine et al.), information learned in the field test also informed the full-scale student interview design. (For a list of the final set of student interview data elements, see appendix C.)

The second follow-up interview consisted of four sections, grouped by topic. Respondents were guided through each section of the interview according to skip logic that took into account previously provided information from the base-year, 2003–04 National Postsecondary Student Aid Study (NPSAS:04), and the first follow-up study (BPS:04/06) and information recorded as the respondent progressed through the second follow-up (BPS:04/09) interview. Following are descriptions of the four interview sections.

1. **Enrollment History** collected information about all undergraduate enrollment from July 2006 through June 2009, with a focus on the attainment of a bachelor's degree. It also captured any postsecondary enrollment following attainment of the bachelor's degree.
2. **Enrollment Characteristics** gathered information on the respondent's experiences at the primary undergraduate school, which was the school where he or she had earned a bachelor's degree or, if no bachelor's degree had been earned, where he or she most recently had been enrolled. This section captured the respondent's major or field of study, any employment while enrolled at the primary undergraduate school, and any undergraduate financial aid received.

3. **Employment** collected information about the respondent's current employment status and job description (e.g., occupation, industry, earnings, satisfaction). This section applied to all bachelor's degree recipients regardless of current enrollment status and to any other respondents who were not enrolled at the time of the interview.
4. **Background** obtained information about student demographic characteristics, including citizenship, voting behavior, marital status and family composition, annual income and monthly expenses, volunteer activity, disability status, and education and teaching plans.

The interview sections and principal topics in each section are summarized in figure 4. For the complete BPS:04/09 full-scale instrument facsimile, see appendix D.

Figure 4. Interview sections and topics: 2009

1	Enrollment History	2	Enrollment Characteristics
	Additional undergraduate schools attended since 2006 Degree attainment since 2006 Any postbaccalaureate enrollment		Major or field of study Grade point average Job(s) while enrolled Undergraduate financial aid Satisfaction with choice of institution, major, and undergraduate education
3	Employment¹	4	Background
	Occupation, employer type, industry Job earnings and benefits Relationship of job to undergraduate course of study Licenses and professional certifications Periods of unemployment		Citizenship and voting Marital status and household composition Annual income and monthly expenses Volunteer activity Educational and teaching plans Disabilities

¹ Only bachelor's degree recipients and respondents who were not currently enrolled received this section.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

A single instrument was developed to be administered in three modes: web, telephone, and field. For telephone and field interviews, the interviewer accessed the web instrument through RTI's computer-assisted telephone interviewing Case Management System (CATI-CMS).⁷ An abbreviated version of the interview—containing only the first two sections, Enrollment History and Enrollment Characteristics—was also provided to sample members as a final effort to gain primary enrollment information from sample members unwilling to participate in the full interview.

To minimize mode effects, specific methodological features were incorporated into the instrument to provide web respondents with the assistance normally provided by a trained interviewer:

- help text on every form to define key terms and clarify question intent;
- pop-up messages to correct responses that were out of range or in an incorrect format;
- conversion text to encourage responses to critical items when these items were left unanswered; and

⁷ CATI-CMS is the system that assigns cases to be called and provides telephone interviewers with the appropriate screens and scripts to be used during the contacting and locating phase of CATI.

- pop-up messages prompting sample members to provide a response when they left three consecutive questions blank.

Additionally, instructions indicating how each question was to be administered (e.g., whether the response options were to be read aloud, when to probe) were included for telephone and field interviewers on each screen to minimize differences between interviews administered by an interviewer and web interviews.

Coding systems. Assisted coding systems were used in the interview to standardize the collection and coding of the respondent's postsecondary schools attended, major or field of study, and occupation. The name or title of each of these items was entered as a text string in each coder, and a keyword search conducted on an underlying database returned a list of possible matches. An assisted coding system was not used to code industries, but ready industry definitions allowed respondents and interviewers to select an industry classification from among a list of standardized options. Following are descriptions of the individual coding systems and sources:

- The *postsecondary school coder* was developed from the set of institutions contained in the Integrated Postsecondary Education Data System (IPEDS), developed by NCES (<http://nces.ed.gov/ipeds/>). For any schools not listed in the database, respondents were asked to provide the control (e.g., public or private) and level (e.g., 4-year or 2-year) of the school.
- The *major coder* was constructed using the 2010 Classification of Instructional Programs taxonomy, also developed by NCES (<http://nces.ed.gov/ipeds/cip2010>). For any majors or fields of study not listed in the database, respondents were asked to provide a general major area and a specific discipline.
- The *occupation coder* was built from the Occupational Information Network Online (O*NET OnLine) database (<http://online.onetcenter.org>). For any occupations not listed in the database, respondents were asked to provide a general area, a specific area, and finally a detailed classification area for the occupation.
- The *industry coder* was based on the North American Industry Classification System (<http://www.census.gov/epcd/www/naics.html>). A text string was collected from the respondent, and then the respondent was asked to choose the category that best described his or her employer's industry. Industry choices were laid out in general categories across the screen. When the respondent selected a category, examples of businesses within that industry were displayed, allowing the respondent to determine the appropriateness of the industry chosen.

Spanish interview. A Spanish interview was developed from the BPS:04/09 abbreviated interview and for the first time was made available in web mode. This particular mode of administration required the translation into Spanish of not only question wording and response options but also of all the specific methodological features incorporated into the instrument to provide web respondents with the assistance normally provided by a trained bilingual interviewer (i.e., help text, pop-up messages to correct responses that were out of range or in an incorrect format, conversion text, and general error messages). The school names in the IPEDS coder and the majors in the major coders (the only coders in the abbreviated Spanish instrument) were not translated; however, instructions were provided in Spanish to both respondents and bilingual telephone and field interviewers explaining that they should choose a school or major code in

English, if possible, or instead enter a text string in Spanish and not attempt the coding of the school or major.

3.1.2 Data Collection Systems

This section describes the data collection systems used for the BPS:04/09 data collection, including the Hatteras Survey Engine and Survey Editor (RTT's proprietary web-based interviewing software), the Instrument Development and Documentation System (IDADS), and the Integrated Management System (IMS).

Hatteras Survey Engine and Survey Editor. The BPS:04/09 survey instrument was created with Hatteras, a web-based system in which project staff developed, reviewed, tested, modified, and communicated changes to specifications and code for the instrument. All information relating to the instrument was stored in an SQL Server database and was made accessible through web browser interfaces. Hatteras provided specification, programming, and testing interfaces for the BPS instrument as follows.

- *Specifications.* Hatteras provided the tools and user interface for developing interview specifications. Specification content included wording at the form, question, item, and response option levels; help text content; item-level data documentation; and form-level question administration documentation. Specific capabilities of the Hatteras system allowed instrument designers to import any relevant specifications used in prior studies, create skip logic and item documentation, and search a library of survey items. Instrument designers were also able to take advantage of a comprehensive comment tracking system to communicate and test necessary instrument changes with programmers.

A web interface provided access for project staff at MPR Associates, Inc. (MPR), and at NCES to test and comment on the instrument throughout development.

- *Programming code.* For simple instrument questions and items, Hatteras automatically translated specifications into web page scripts when the web page was accessed. For questions involving complex routing, multiple question wording or response option conditions, or nonstandard page layout or behavior, programmers entered custom programming code—HTML, JavaScript, and C# .NET script—into the Hatteras custom code interface. This code was stored in the SQL database server, together with the instrument specifications for compilation by the survey execution engine.
- *Instrument testing and execution.* The Hatteras system's survey execution engine allowed immediate testing of specification and code content as it was developed and updated by displaying web content as respondents would see it. The execution engine also automatically handled such web instrument functions as backing up and moving forward, recording instrument timing data, displaying critical-item wording, validating user input, displaying conditional instructions based on interview mode (web, telephone, or field) and linking to context-specific help text.
- *Survey sites and data transfer—Web/telephone.* For web and telephone data collection, the Hatteras survey execution system was installed on the surveys server and SQL database server at NCES. Web respondents accessed the survey directly by web browser after logging in with a user ID and password. RTT's telephone interviewers accessed the same NCES web survey site by means of a web browser process launched from RTT's CATI-

CMS. All connections to the NCES web interview were secured with Secure Sockets Layer (SSL) encryption. Automated processes transferred data between RTI's local database and the NCES database via a secure, encrypted connection.

- *Survey sites and data transfer—Field.* For field interviews, the Hatteras survey execution system was installed on local web and database servers on laptop computers. Field interviewers accessed the laptop-based survey by logging in through three independent levels of security, including a whole-disk encryption outer level. Interview control and response data were transferred between RTI and field laptops via secure, encrypted, automated connections.

Instrument Development and Documentation Systems (IDADS). The web-based IDADS documentation module contained the finalized version of all instrument items, their screen wording, and variable and value labels. Also included were the more technical descriptions of items such as variable types (alpha or numeric), to whom the item was administered, and frequency distributions for response categories based on completed interview data. The documentation module was used to generate the instrument facsimiles and the deliverable electronic codebook (ECB) input files.

Integrated Management System (IMS). All aspects of the study were controlled using an IMS, a comprehensive set of desktop tools designed to give project staff and NCES access to a centralized, easily accessible repository for project data and documents. The BPS:04/09 IMS consisted of several components: the management module, the Receipt Control System (RCS) module, and the instrumentation module.

- *Management module.* The management module of the IMS included tools and information to assist project staff and the NCES project officer in managing data collection. All management information pertinent to the study was located there, accessible via the Web, and protected by SSL encryption and a password-protected login. The IMS contained the current project schedule, monthly progress reports, daily data collection reports and status reports (generated by the RCS described below), project plans and specifications, project deliverables, instrument specifications, a link to the Hatteras system, staff contacts, the project bibliography, and a document archive.
- *Receipt Control System (RCS).* The RCS is an integrated set of systems that was used to control and monitor all activities related to data collection, including tracing and locating. Through the RCS, project staff were able to perform tracing and data management operations, track case statuses, identify problems early, and implement solutions effectively. The RCS's locator data were used for a number of daily tasks related to sample maintenance. Specifically, mailout systems produced paper mailings and e-mailings to sample members, the query system enabled administrators to review the locator information and status for a particular case, and the mail return system enabled project staff to update the locator database as mailings or address update sheets were returned or forwarding information was received. The RCS also interacted with the computer-assisted telephone interviewing (CATI) system, sending locator data between the two systems, as necessary.
- *Instrumentation module.* The instrumentation module managed development of the multimode web data collection instrument within Hatteras. Developing the instrument

with Hatteras ensured that all variables were linked to their item and screen wordings and were thoroughly documented.

3.2 Student Interview Data Collection

The BPS:04/09 interview data collection involved training data collection staff and locating, contacting, and interviewing sample members. Each of these procedures is detailed in this section.

3.2.1 Training of Interview Data Collection Staff

Members of the data collection staff included quality control supervisors (QCS), help desk agents (HDAs), telephone interviewers, field interviewers, and intensive-tracing staff. Prior to beginning work on BPS, all data collection staff completed a comprehensive training program. Topics covered in training programs included a review of confidentiality requirements, an overview of the BPS:04/09 study, frequently asked questions (FAQs), and administrative procedures for case management as well as hands-on practice. All training programs were designed to maximize active participation of the trainees. The training schedule and number of data collection staff trained are presented in table 6.

Table 6. Training of interview data collection staff: 2009

Staff trained	Time period	Number of staff trained
Quality control supervisors	February 14, 2009, and March 12, 2009	15
Help desk agents	February 16–19, 2009	13
Telephone interviewers	March 17–19, 2009	31
Intensive-tracing staff	April 1, 2009, and April 29, 2009	16
Field interviewers	June 15–18, 2009, and July 27–31, 2009	43

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

The specific roles and duties of data collection staff are summarized in the following subsections, along with a description of the training program (see appendix E for training materials).

Quality control supervisors. QCS provided support and guidance for the telephone interviewers, monitored interviewer production, and helped troubleshoot problems. They attended BPS project supervisor training and also participated in telephone interviewer project training. Training included an overview of BPS:04/09, conversational interviewing techniques expected of interviewing staff, problem resolution, case review, an explanation of project-specific reports, and other specific project procedures and protocols. The QCS were also provided with a supervisor manual to be used as a reference throughout the course of data collection.

Help desk agents. A staff of help desk agents assisted any sample members who had questions or problems while completing web interviews. HDAs were certified telephone interviewers specially trained to unlock cases, reissue passwords, record and track calls to the study help line via the help desk application, and effectively respond to any caller's questions. During the early response period, HDAs also made prompting calls to first follow-up (BPS:04/06) interview nonrespondents and completed telephone interviews with sample members who preferred a telephone to a web interview. Help desk training materials included a project telephone interviewer manual with a help desk supplement and various project handouts.

Telephone interviewers. Telephone interviewers were responsible for gaining cooperation from and conducting interviews with sample members, avoiding interview refusals, and addressing the concerns of reluctant sample members. Telephone interviewers received 16 hours of training that included an overview of the study, an in-depth review of the interview instrument, hands-on practice administering the telephone interview, review of appropriate conversational interviewing techniques, and practice with the CATI-CMS. At the conclusion of training, all telephone interviewers were certified by successfully conducting mock telephone interviews and by providing satisfactory responses to the study's FAQs. Telephone interviewer training materials included a telephone interview manual and multiple project handouts.

Field interviewers. Field interviewers conducted interviews, either in person or by telephone, with sample members residing in 25 selected geographic clusters in the United States and Puerto Rico. Field interviewers were required to attend a 3-day training session held in Durham, North Carolina. Prior to the classroom training, each field interviewer was required to complete a home study exercise. Field interviewers received classroom training similar to that of telephone interviewers, with additional training on the field CMS, field locating strategies, management of the case assignment folders, and proper care and use of the BPS laptops. Field interviewers were also required to conduct successful certification mock interviews and multiple other certification exercises before they were permitted to begin work. Field interviewer training materials included a field interviewer manual and additional handouts and forms documenting all field procedures and expectations of work.

Tracing staff. Tracing staff (tracers) used intensive measures (described in section 3.2.3) to locate sample members designated as lacking good telephone contacting information. Tracers attended a comprehensive 16-hour training session led by RTI tracing managers and covering all tracing procedures. Tracers also received 2 hours of project-specific training. They received an overview of BPS, a review of the FAQs, background information on the BPS sample, and the tracing techniques best suited to locating BPS sample members.

Additional trainings. Selected staff received additional training modules, such as refusal-conversion training, and Spanish interview training (certified bilingual staff). Additionally, quality circle meetings were routinely conducted as an extension of the training program for continual quality improvement. Data collection staff were given the opportunity to ask questions in quality circle meetings, and as needs were identified, additional training topics were highlighted and addressed in subsequent meetings. After each meeting, quality circle notes were posted on the call center's project website and on the project IMS.

3.2.2 Study Website

BPS:04/09 sample members were provided with a link to the BPS website prior to the start of data collection. The website provided general information about the BPS set of studies, including details about the study sponsor and contractors, how the data are used, answers to FAQs, confidentiality assurances, and selected findings from earlier BPS studies. The website also provided contact information for the study help desk and project staff at RTI, as well as links to the main NCES and RTI websites. Sample members were able to log in to the secure portion of the website to provide updated contact information and complete the student interview once it became available.

Designed according to NCES web policies, the BPS:04/09 study website used a three-tier security approach to protect all data collected. The first tier of security included secure log-ins, with

a unique study ID and strong password provided to sample members prior to the start of data collection. The second tier of security protected any data entered on the website with SSL technology, allowing only encrypted data to be transmitted over the Internet. The third tier of security stored any collected data in a secured SQL Server database located on a server machine that was physically separate from the web server. Figure 5 shows the home page for the BPS:04/09 study website.

Figure 5. BPS:04/09 website home page: 2009

BPS
Beginning Postsecondary Students
Longitudinal Study

Sponsored By: National Center for Education Statistics, U.S. Department of Education

Home

Home
About BPS
FAQs
Confidentiality
Contact Us
Login to the Interview

OMB Clearance No.: 1850-0631
Expiration Date: 12/31/2010
[Burden Statement](#)

Welcome to the **Beginning Postsecondary Students Longitudinal Study (BPS)** Website! The BPS study collects data related to enrollment in and transition out of postsecondary education. You were selected to participate in BPS because you first enrolled in college or other postsecondary education during the 2003-2004 school year. Study participants were first contacted in 2004 and again in 2006. Now we want to contact you one last time to find out about your education, employment, and other experiences during the past few years.

To access the BPS interview online, enter your BPS study ID number and password, which are printed on the letter that was recently mailed to you, or included in an e-mail message you may have received. **We recommend that you use Internet Explorer, Firefox, or Netscape as your browser to complete the web version, and you will need to temporarily disable any pop-up blockers you have enabled.** For instructions on how to temporarily disable your pop-up blocker, click [here](#). We thank you in advance for your participation.

BPS study ID Number:
Password: (the password is case-sensitive)

If you'd prefer to be contacted by a trained interviewer from RTI International, please [click here](#).

You can obtain additional information about the BPS study by using the links to the left of this page. If you need additional assistance, send an e-mail to bps@rti.org or call toll-free at 1-800-334-2321.

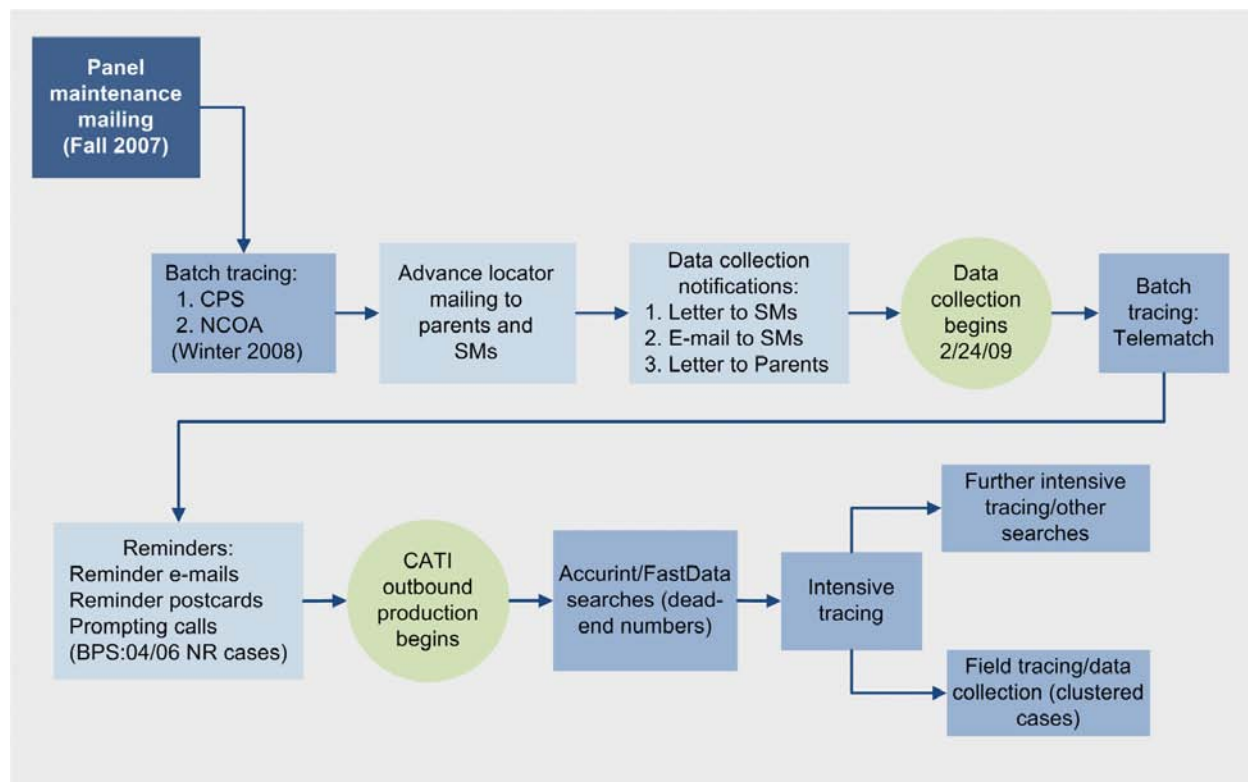
VERISIGN SECURED
VERI

National Center for Education Statistics, Institute of Education Sciences
U.S. Department of Education
1990 K Street, NW, Washington, DC 20006 USA

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.2.3 Locating and Contacting Sample Members

Several locating methods were used to find and collect up-to-date contact information for the BPS:04/09 sample (figure 6). Batch searches of national databases and prenotification address update mailings were conducted prior to the start of data collection. After the start of data collection and for those sample members not yet found, follow-up locating methods were employed, including CATI locating, intensive tracing, and field tracing.

Figure 6. Locating methods: 2009

NOTE: CATI = computer-assisted telephone interviewing. CPS = Central Processing System. NCOA = National Change of Address. SM = sample member. NR = nonresponse.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

- Batch tracing.** Before mailing activities began, batch database searches were conducted to update sample member contact information. These searches used the U.S. Department of Education's Central Processing System (CPS) and the U.S. Postal Service (USPS) National Change of Address (NCOA) databases. The information obtained from these sources was compared with the information previously available from the first follow-up (BPS:04/06) locator database to identify any new contact information. Then, just prior to the start of outbound telephone interviewing, all sample member addresses and telephone numbers were sent to Telematch, a computerized residential telephone number service with the not-yet-published numbers of new movers, to obtain any telephone number updates.
- Mailings.** To maintain contact with the BPS:04 cohort between the end of the first follow-up (BPS:04/06) data collection and the beginning of the second follow-up (BPS:04/09) data collection, a panel maintenance postcard was sent in November 2007. The postcard, signed by the BPS project director, asked sample members to visit the BPS student website to provide updated locating information. Any locating information collected from the panel maintenance update was combined with locating information from the first follow-up study and was used to populate the second follow-up study locator database.

In January 2009, about 6 weeks before the start of BPS:04/09 data collection, a mailing went to the parents of sample members younger than 26 years old so as to gain their

assistance with providing up-to-date contact information for these sample members. This mailing included a study brochure, a letter with detailed information about BPS:04/09 signed by the associate commissioner of NCES, an address update sheet, and a business reply envelope.

The final step in the pre-data collection locating and contacting effort occurred approximately 3 weeks before the start of data collection, with a similar address update mailing going to sample members (using any updated contact information provided by parents, if applicable). The mailing contained a letter notifying sample members of the upcoming BPS:04/09 data collection, a copy of the study brochure with responses to the FAQs, an address update sheet, and a business reply envelope. Sample members were asked to update their address information on the address update sheet and return it in the postage-paid envelope. They also had the option of entering the information using the online form available on the BPS website. The address update sheet and online form included a prompt for sample members to indicate a preference for being notified by text message at the start of data collection.

A data collection announcement was mailed on February 23, 2009, to first follow-up (BPS:04/06) interview respondents in a 9 x 12 inch BPS envelope by USPS first-class mail and to first follow-up interview nonrespondents by USPS Priority Mail. The mailing to all sample members included a study brochure and a letter that announced the start of data collection (appendix F). The letter, signed by both the BPS project director and the NCES project officer, informed sample members of the cash incentive for completing the interview by March 23, 2009, provided the study website and sample member's user ID and password for accessing the web interview, and provided the study's toll-free help desk number and e-mail address. On February 25, 2009, an e-mail containing information comparable to that in the data collection announcement letter was sent to sample members. On February 26, 2009, a letter was mailed to parents of all sample members younger than 26 years old (when a parent address was available), explaining the importance of the study and asking parents to encourage sample members to participate. Additional mailings included a postcard reminder sent about 10 days after the data collection announcement and two additional e-mail reminders to encourage early interview response. Once outbound telephone interview efforts began and throughout data collection, periodic mailings and e-mails went to interview nonrespondents throughout the course of data collection.

- **CATI locating and pre-intensive tracing.** Telephone interviewers made prompting calls to first follow-up (BPS:04/06) interview nonrespondents during the early response period of data collection. These calls, described in more detail in section 3.2.4, helped identify cases that required further tracing. Once outbound telephone interviewing began, telephone interviewers conducted limited tracing and locating activities, as needed. The telephone number believed to be the best known number for contacting the sample member was attempted first. If the sample member could not be reached at that number after several attempts, any other numbers associated with the sample member, including parent and other contacts, were called. If the sample member could not be located the case was designated for FastData and Accurint batch services which provided an automated search for matching phone numbers to sample members using combinations of address, name, and SSN. Cases for which neither FastData nor

Accurint batch generated new telephone numbers were sent for intensive interactive tracing by RTI's Tracing Operations (TOPS).

Overall for BPS:04/09 data collection, the batch matching successfully confirmed contact information or provided new contact information for 29,370 records.⁸ The most records, 11,050, were matched through Telematch. While the fewest records, 1,310, were matched through FastData, this data source minimized the number of cases requiring more costly intensive tracing. Table 7 shows the match rates for each tracing source.

Table 7. Batch processing record match rates, by tracing source: 2009

Tracing source	Number of records sent	Number of records matched	Percent matched
Total	57,600	29,370	51.0
CPS	18,030	7,500	41.6
NCOA	18,530	6,970	37.6
Telematch	14,600	11,050	75.7
FastData	2,730	1,310	47.8
Accurint	3,700	2,540	68.7

NOTE: Detail may not sum to totals because of rounding. CPS = Central Processing System. NCOA = National Change of Address.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

- Intensive tracing.** The most difficult locating cases were traced at TOPS using a two-tiered strategy and a number of sources. TOPS-1, the first tier, identified sample members with Social Security numbers (SSNs) to trace them through consumer databases (FastData's SSN search and Experian) that contain current address and telephone listings for the majority of consumers with credit histories. If a search generated a new telephone number for the sample member, tracers attempted to confirm the information by speaking with the sample member or with someone else who could confirm the information. If the number was confirmed, the case was sent back to CATI for telephone interviewing. This first level of effort minimized the time that cases were in tracing and unavailable for CATI efforts. Cases still not located and not in a field cluster underwent a more intensive level of tracing in TOPS-2. TOPS-2 included calls to other possible sources of information, including, for example, directory assistance, alumni offices, and contacts with neighbors or landlords. Whenever any of these sources provided information that indicated a sample member was not available for the study (e.g., deceased, incarcerated, or out of the country), no further contact efforts were made.

Prior to the start of the student interview data collection, 30 cases of the 18,640 sample were found to be deceased; overall, about 17 percent of the remaining 18,610 sample members required intensive tracing (table 8). Forty-three percent of the first follow-up (BPS:04/06) interview nonrespondents required intensive tracing, compared with 11 percent of first follow-up interview respondents ($t(4,458) = 37.85, p < .001$). Thirty-four percent of sample members whose NPSAS institutions were private for-profit less-than-2-year schools required intensive tracing, compared with 8 percent of sample

⁸ The number of records matched exceeds the number of sample members because individual sample members may have had their contact information sent to a number of the batch tracing sources.

members whose NPSAS institutions were private, nonprofit 4-year doctorate-granting schools ($t(2,477) = 18.95, p < .001$) or public, 4-year doctorate-granting schools ($t(2,108) = 19.97, p < .001$).

Table 8. Cases requiring intensive tracing, by first follow-up response status and institution type: 2009

First follow-up response status and institution type	Total	Cases requiring intensive tracing	
		Number	Percent
Total	18,610	3,180	17.1
First follow-up response status			
Respondent	14,900	1,590	10.6
Nonrespondent	3,720	1,590	42.8
Institution type			
Public			
Less-than-2-year	600	140	24.0
2-year	6,380	1,280	20.1
4-year non-doctorate-granting	1,600	170	10.6
4-year doctorate-granting	3,080	250	8.0
Private nonprofit			
2-year-or-less	550	130	23.7
4-year non-doctorate-granting	2,210	220	9.9
4-year doctorate-granting	1,580	120	7.8
Private for-profit			
Less-than-2-year	1,570	530	33.8
2 years or more	1,050	330	31.6

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

- **Field tracing.** Any cases not located after TOPS-1 intensive tracing and thought to be in one of the 25 selected geographic field clusters were designated for field tracing instead of being sent to TOPS-2. Information provided to field interviewers included all address information available for an assigned case, the results of TOPS-1 intensive tracing efforts, and the details of all call attempts made by telephone interviewers. In addition to these tracing resources, field interviewers had access to contacts within the community, such as post office mail carriers or local public records that could provide additional information. Many field interviewers also had the added advantage of calling from telephones with local area codes familiar to sample members, increasing the likelihood that sample members would respond to the telephone calls.

3.2.4 Interviewing

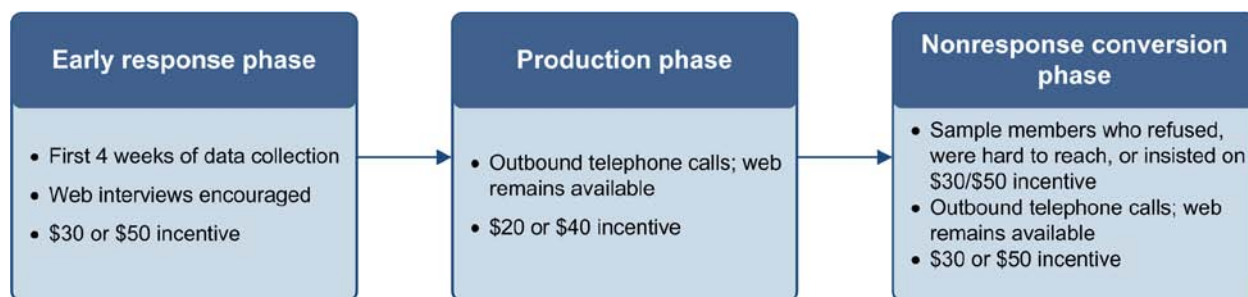
Data collection for the BPS:04/09 interview consisted of three phases (figure 7):

1. *Early response phase.* This phase began with the start of data collection in February 2009 and lasted approximately 4 weeks, until March 23, 2009. First follow-up (BPS:04/06) student interview respondents who completed the second follow-up (BPS:04/09)

student interview during this phase received an incentive of \$30; First follow-up student interview nonrespondents received a \$50 incentive.⁹

2. *Production phase.* During this phase, interviewers called to encourage sample members to complete the interview by telephone or on the Web. First follow-up student interview respondents received a \$20 incentive during this phase; First follow-up student interview nonrespondents received a \$40 incentive.
3. *Nonresponse conversion phase.* Cases in this phase belonged to one of the following groups: interview refusal by the sample member or a sample member contact, *hard-to-reach*,¹⁰ not locatable after intensive tracing, *insist-pay*,¹¹ and field cases that did not fit into one of the preceding groups. First follow-up student interview respondents who completed the second follow-up interview during the nonresponse conversion phase were offered a \$30 incentive, and first follow-up student interview nonrespondents were offered a \$50 incentive. Data collection ended in October 2009.

Figure 7. Data collection phases: 2009



SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Sample members could complete the interview on the Web or by telephone throughout the data collection period. The interview screens in the telephone and field interviews were identical to those in the web interviews, except that interviewer instructions on how to administer each question were visible at the top of each screen for telephone and field interviews. Following are details of the administration of the interview through the various modes.

Web interviews. Sample members were informed of the web interview in the data collection announcement mailing. During the early response period (the first 4 weeks of data collection), only web interviews were completed unless sample members initiated a telephone interview by calling the help desk or sending an e-mail asking to be called. Reminder mailings and e-mails were sent throughout the production and nonresponse conversion phases of data collection to encourage sample members to complete the interview online. The website was accessible 24 hours a day, 7 days a week, throughout the data collection period, providing sample members with the option to complete the interview online at any time.

Help desk operations. The help desk for BPS:04/09 opened on February 24, 2009, in anticipation of the first respondent calls after the data collection announcement mailing. Help desk

⁹ First follow-up (BPS:04/06) student interview nonrespondents received telephone prompting calls during the early response phase to remind them of their inclusion in the study and to encourage their participation.

¹⁰ *Hard-to-reach* cases were those that were called at least 15 times (8 times for first follow-up nonrespondents) and yielded minimal or no contact with the sample member.

¹¹ *Insist-pay* cases were those in which sample members completed the interview during the production phase but insisted on receiving the incentive amount offered during the early response phase.

staff were available to assist sample members who had questions or problems accessing and completing the web interview. A toll-free help line was established to accept incoming help desk calls. If technical difficulties prevented sample members from completing the web interview, HDAs—also trained to conduct telephone interviews—would encourage sample members to complete a telephone interview.

A help desk application was created to document incoming calls from sample members and other contacts. Specifically, the help desk application included the following:

- information needed to verify the sample member's identity;
- login information needed by the sample member to access the web interview;
- a means to update sample member contact information, as needed;
- functionality to unlock cases and send an e-mail containing the website and study login information to the sample member;
- systematic documentation of each call; and
- a means for tracking calls that could not be resolved immediately.

The help desk application provided project staff with a means to monitor the resolution status of all help desk events and reports on the type and frequency of problems experienced by sample members.

Telephone interviews. Telephone follow-up locating and interviewing began on March 24, 2009, after the 4-week early response period ended. Telephone interviewing procedures included attempts to locate, gain cooperation from, and interview sample members who had not yet completed the interview. Interviewers encouraged sample members to complete the interview by telephone; however, sample members could still complete the interview on the Web, if that was their preference. Sample members who did express a preference to complete a web interview were called back 5 days later for follow-up if the interview had not yet been completed.

The CATI-CMS included an automated call scheduler that assigned cases to interviewers by case priority, time of day, day of week, existence of previously scheduled appointments, and type of case. Case assignment was designed to maximize the likelihood of contacting and interviewing sample members, and cases were assigned to various queues accordingly. For example, the CMS included queues for new cases that had not been called, Spanish-language cases, initial refusals, and various appointment queues. In addition, available telephone numbers for each case were automatically prioritized for the interviewers. As new roster lines were added—as a result of CATI tracing, other tracing efforts, and information from other sources such as respondent e-mails or help desk call-ins—available telephone numbers were reprioritized based on the new information.

Some cases required special treatment. For cases with sample members or contacts who spoke only Spanish, bilingual interviewers were available to administer a Spanish interview (see section 3.1.1 for details regarding the Spanish interview). To gain cooperation from those sample members who initially refused to participate (as well as from contacts such as parents and roommates who acted as *gatekeepers* to the sample member), interviewers were trained in refusal-conversion techniques. As the end of data collection approached, all telephone interviewers were trained to administer the abbreviated English-language interview to any reluctant sample members.

Field interviews. Field data collection activities began approximately 3 months after the start of outbound telephone interviewing, during the nonresponse conversion phase of data collection. Using the last known address for each case, RTI's Geographic Information System (GIS) program conducted an analysis of the BPS:04/09 sample to identify the 25 geographic areas with the highest density of sample members residing within a 100-mile radius of the cluster center. On the basis of this analysis, 43 field interviewers were hired to work nonrespondent cases that required field efforts. An Integrated Field Management System provided reports that helped project staff manage the progress of the field interviewing effort. Once assigned to the field, cases were excluded from further outbound efforts from the call center but could still be completed on the web or by telephone if sample members called the help desk to complete the interview. See section 3.4.1 Student Interview Response Rates for results of field, telephone, and web interviews.

3.2.5 Other Procedures to Maximize Locating and Interview Response

Throughout data collection, the BPS project team continued to work with TOPS and other available resources to evaluate additional tracing efforts that could benefit BPS data collection. In addition to the locating sources and methods already described, BPS:04/09 used several other procedures to maximize locating and interview response.

Other locating methods. Other locating methods used to find sample members included the following:

- *Experian credit header search.* Halfway through data collection, an Experian credit header search was conducted to obtain phone numbers and addresses associated with sample members according to their credit histories. This search provided a relatively low-cost alternative to other intensive tracing methods. Priority was given to sample members who had not yet been located or dead-ended in CATI, but the search was also conducted for sample members who were once located but never reached or who were located but not reached for several weeks.
- *FastData's Superphone search.* Halfway through data collection, TOPS also began conducting a FastData Superphone search for telephone numbers on cases that had recently gone through the first round of TOPS-1 tracing but for which no locating information was found. Unlike many other tracing sources, FastData's new Superphone search provided cell phone numbers as well as landline numbers.
- *Experian MetroNet batch search.* During the nonresponse conversion phase of data collection, this search was conducted to find new contact information for all cases where interviews had not yet been completed. Experian MetroNet batch searches self-reported consumer-contacting databases. This search provides up-to-date contact information for more than 140 million households and is updated every 2 weeks.

Other contacting methods. Text messaging and social networking (Facebook and MySpace) were additional methods used to contact sample members and encourage interview completion.

- *Text messages.* Some sample members were contacted by Short Message Service technology, or text messaging. A text message reminder to complete the BPS:04/09 interview was sent during the early response data collection period to those sample members who had requested on their address update sheet that a text message be sent. A text message reminder was also sent during the nonresponse conversion phase to sample

members with a cell phone number on record who had not yet completed the interview. Each text was sent manually from a project mobile phone. The text message included the sample member's first name, mention of the BPS interview, expected length of the interview, the incentive amount available, and the name of the project staff person sending the text message.

- *Social networking.* Two popular social networking sites, Facebook and MySpace, were used to generate new leads for and to make contact with sample members who were difficult to locate. BPS:04 cohort information on record—such as postsecondary institutions attended, city/state networks, e-mail addresses, and birth dates—were used to search for sample members on Facebook or MySpace. Once the targeted individual was believed to be found, an e-mail message describing BPS and the incentive being offered, as well as reminding the individual of any past participation in the study, was sent through internal messaging on the social networking site. Although the message included the study website and help desk telephone number, no personally identifying information (such as login information) was included; this information could only be provided to a sample member who visited the study website or contacted the help desk and verified his or her identity. Efforts to contact sample members by Facebook were ceased because of restrictions on the number of messages sent to individuals. When few BPS messages were opened by sample members contacted through MySpace, the use of social networking sites was abandoned in favor of the other, more promising locating and contacting methods.

3.3 Data Collection Quality Control

A number of quality control (QC) procedures were implemented throughout the course of the BPS:04/09 student interview data collection. These procedures included frequent interview monitoring of telephone interviewers, a help desk that tracked and resolved difficulties encountered by sample members attempting to complete the web interview, quality circle feedback meetings, and HDA, interviewer, and tracer debriefings at the conclusion of the study.

3.3.1 Interview Monitoring

Regular monitoring of telephone interviews during BPS:04/09 data collection was conducted to meet the following important data quality objectives:

- identification of problem items in the interview;
- reduction in the number of interviewer errors;
- improvement in interviewer performance through reinforcement of effective strategies; and
- assessment of the quality of the data collected.

Quality control supervisors (QCS) at Call Center Services and project staff monitored live and recorded interviews throughout data collection, using remote monitoring telephones and computer equipment. To guarantee an accurate reflection of data collection activities, QCS monitored day, evening, and weekend shift interviewers. In addition, each week QCS and interview project staff monitored one live interview session and one recorded interview session. The live session allowed for monitoring of calls and interviews in progress, including remotely viewing

interviewers' computer screens as they progressed through the interview and listening to interviews in real time, while the session with recorded interviews allowed only listening to the interview but guaranteed an opportunity to hear complete interviews. QCS and interview project staff recorded observations on standardized monitoring forms that covered such topics as interviewer professionalism, question administration, and knowledge of the instrument. After each monitoring session, interviewers received feedback based on observations from the session. Issues and trends identified during monitoring were frequently incorporated into quality circle meetings to improve the quality of telephone interviews.

3.3.2 Help Desk

A help desk, described in section 3.2.1, was available to sample members. To gain a better understanding of the problems encountered by sample members, HDAs used a web-based application to record each help desk incident that occurred during data collection. For each incident, an HDA confirmed contact information for the sample member, noted the source (e.g., incoming telephone call, voice mail, or e-mail; request from the study website), recorded the type of problem, provided a description of the problem and resolution, and indicated the incident status (pending or resolved). If the problem was not resolved immediately, the HDA scheduled a follow-up appointment.

Table 9 provides a summary of help desk incidents encountered during BPS:04/09 data collection. HDAs handled a total of 780 help desk incidents. The most common type of incident was from sample members requesting their study ID, password, or both (69 percent). Miscellaneous issues, including requests to complete the interview over the telephone, were the second most common category (16 percent). An additional 8 percent of incidents dealt with pop-up blocker issues. Three percent of the incidents reported were related to browser settings and computer problems. Incidents in which sample members indicated that the study website was down or unavailable represented 2 percent of all help desk requests, as did questions about the study. Incidents involving questionnaire content and instrument errors each accounted for less than 1 percent of help desk incidents.

Table 9. Help desk requests, by type of incident reported: 2009

Type of incident reported	Help desk requests	
	Number	Percent
Total	780	100.0
Study ID/password	540	68.6
Pop-up blocker issues	60	8.2
Browser settings/computer	20	2.6
Website down/unavailable	20	2.3
Questions about the study	20	1.9
Questionnaire content	#	0.4
Instrument error	#	0.3
Other requests, not classifiable	120	15.8

Rounds to zero.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.3.3 Quality Circle Meetings

Quality circle meetings were essential as part of a feedback loop for ensuring that project staff, CCS, and telephone interviewers were communicating on a regular basis about the goals of the study and addressing challenges encountered along the way. These meetings provided a forum for discussing elements of the instrument design and interview cooperation tactics, motivating the group toward the goals of the study, and acquiring feedback on data collection issues. Weekly quality circle meetings for telephone staff were held at the call center, while quality circle meetings for the field staff were held via conference call. Issues discussed at these meetings were added to weekly notes, which all interviewers were required to access electronically. These quality circle notes included counts of interview completions to date, separate sections for general data collection issues and issues specific to the survey instrument, and project staff responses to questions from interviewers.

Throughout the study, a variety of issues were addressed at the quality circle meetings that reinforced specific content from training and contributed to prompt problem solving. Some of the issues covered in these meetings included the following:

- clarification of questions and item responses and reinforcement of positive interviewing techniques;
- methods of gaining cooperation from sample members and *gatekeepers* (e.g., parents and roommates);
- problem sheets submitted during interviews;
- the importance of providing and reviewing detailed case comments;
- data security protocols; and
- study progress and general morale boosting.

3.3.4 Debriefing

At the conclusion of the BPS:04/09 data collection, project staff held debriefing meetings with interviewers, HDAs, and tracers to learn more about their experiences, and administered an anonymous online survey of the interviewers. With regard to tracing and locating strategies, interviewers believed that lack of land telephone lines among sample members was in fact a hindrance to tracing and locating but thought that contacting relatives was generally a helpful means of finding sample members. Also, their interactions with sample members led interviewers to emphasize that offering incentives seemed to positively affect participation in the survey. With regard to interview administration and content, debriefing feedback was typically positive, with interviewers identifying specifics of questions that presented challenges to some sample members when read over the phone. Project staff prepared summaries of the debriefing meetings and online survey for consideration when planning future administrations of BPS.

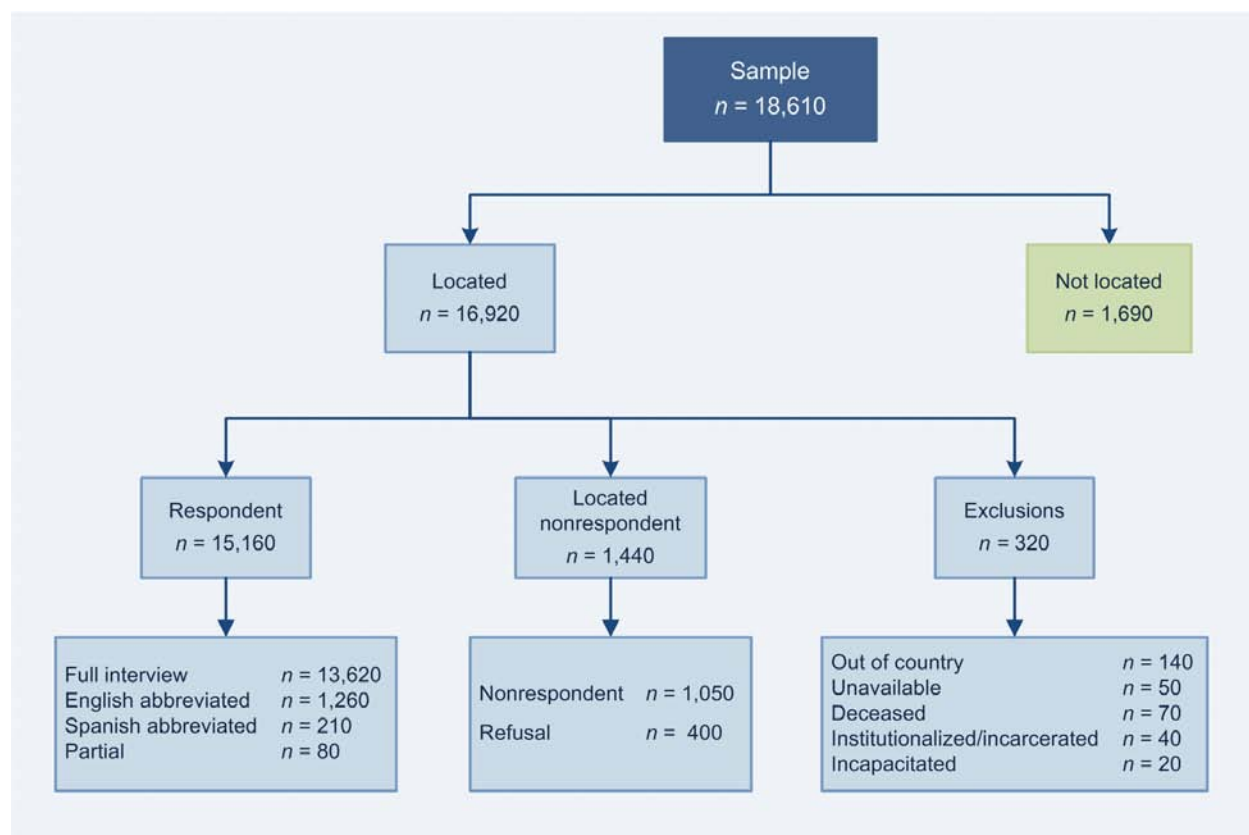
3.4 Student Interview Data Collection Outcomes

This section provides the results of the BPS:04/09 student interview data collection. Details surrounding the overall student interview response rate of 82 percent are included, and a description of the success of various locating methods is also provided. A timing analysis shows that the student interview, on average, took about 20 minutes to complete.

3.4.1 Student Interview Response Rates

BPS:04/09 interviews were administered between February 24, 2009, and October 12, 2009. Of the 18,610 sample members remaining at the start of the BPS:04/09 student interview data collection, 16,920 (91 percent) were successfully located and asked to complete the BPS:04/09 interview, while 15,160 (82 percent) did complete a full interview, an English or Spanish abbreviated interview, or a partial interview.¹² The overall locating and interviewing results for the BPS:04/09 interview data collection effort, including sample members who were located but later considered exclusions for reasons such as being incapacitated or deceased, are presented in figure 8.

Figure 8. Overall locating and interviewing results: 2009



NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Response rates by first-follow up (BPS:04/06) interview response status and institution type. First-follow up interview (BPS:04/06) respondents were located for and completed the second follow-up (BPS:04/09) interview at a higher rate than did first follow-up interview nonrespondents.¹³ First follow-up interview respondents had a locate rate of 94 percent in the second follow-up interview, while the locate rate for first follow-up interview nonrespondents in the second follow-up interview was 80 percent. Of all first follow-up interview respondents, 87 percent completed the second follow-up interview, while 61 percent of first follow-up interview nonrespondents completed the second follow-up interview.

¹² Partial interview status was assigned to any case where the respondent began a full interview and got through at least the enrollment history section but broke off and did not return to complete the interview.

¹³ A *completed* interview is a full interview, an English or Spanish abbreviated interview, or a partial interview.

Overall locate rates of the BPS:04 cohort for the second follow-up interview, based on the institution type of the sample member's base-year interview (NPSAS) school, ranged from 81 percent at private for-profit less-than-2-year schools to 96 percent at private nonprofit 4-year doctorate-granting schools. Overall response rates for the BPS:04 cohort to the second follow-up interview, by NPSAS institution type, ranged from 70 percent at private for-profit less-than-2-year schools to 88 percent at public 4-year doctorate-granting schools and private nonprofit 4-year doctorate-granting schools. Locating and participation results, by first follow-up interview respondent status and NPSAS institution type, are presented in table 10.

Table 10. Locating and participation rates, by first follow-up response status and NPSAS institution type: 2009

First follow-up response status and NPSAS institution type	Total	Located		Interviewed	
		Number	Percent of total	Number	Percent of total
Total	18,610	16,920	90.9	15,160	81.5
First follow-up response status					
Respondent	14,900	13,940	93.6	12,890	86.5
Nonrespondent	3,720	2,980	80.3	2,280	61.2
NPSAS institution type					
Public					
Less-than-2-year	600	520	86.0	460	75.7
2-year	6,380	5,740	90.1	5,050	79.1
4-year non-doctorate-granting	1,600	1,490	93.3	1,360	85.1
4-year doctorate-granting	3,080	2,940	95.4	2,710	87.8
Private nonprofit					
2-year-or-less	550	470	86.4	410	75.2
4-year non-doctorate-granting	2,210	2,080	94.4	1,930	87.2
4-year doctorate-granting	1,580	1,520	96.3	1,400	88.4
Private for-profit					
Less-than-2-year	1,570	1,270	80.9	1,100	70.4
2 years or more	1,050	880	84.1	760	72.2

NOTE: Detail may not sum to totals because of rounding. NPSAS = National Postsecondary Student Aid Study.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Response rates by first follow-up (BPS:04/06) interview response status and interview type. About 90 percent of all second follow-up (BPS:04/09) interview respondents completed the full second follow-up interview, about 10 percent completed an English or Spanish abbreviated second follow-up interview, and less than 1 percent completed a second follow-up partial interview. Ninety-one percent of first follow-up (BPS:04/06) interview respondents completed a full second follow-up interview, compared with 83 percent of first follow-up interview nonrespondents. Seven percent of first follow-up interview respondents completed a second follow-up English abbreviated interview, compared with 16 percent of first follow-up interview nonrespondents. Table 11 provides detail on the number and percent of completed second follow-up interviews, by first follow-up interview response status and by second follow-up interview type.

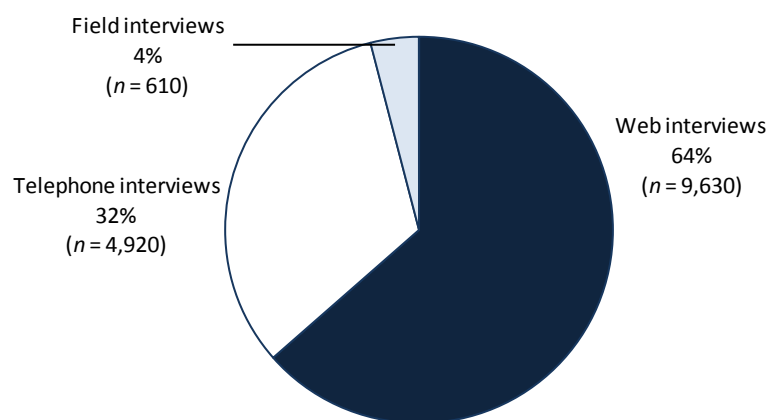
Table 11. Completed interviews, by first follow-up response status and interview type: 2009

Interview type	First follow-up response status					
	Total		Respondents		Nonrespondents	
	Number	Percent	Number	Percent	Number	Percent
Total	15,160	100.0	12,890	100.0	2,280	100.0
Full	13,620	89.8	11,740	91.1	1,880	82.5
English abbreviated	1,260	8.3	900	7.0	360	15.7
Spanish abbreviated	210	1.4	190	1.5	20	0.8
Partial	80	0.5	60	0.4	20	0.1

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

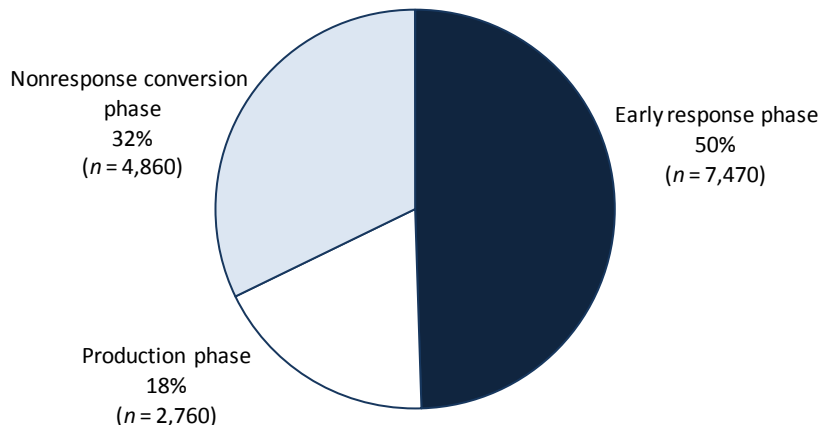
Interview outcomes by mode. BPS:04/09 interviews were completed in one of three modes: web, telephone, or field. Figure 9 shows that most (64 percent) interviews were completed on the web, 32 percent of interviews were completed by telephone, and 4 percent were completed in field interviewing.

Figure 9. Percentage of completed interviews, by mode of administration: 2009

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Response by phase of data collection. Half of all completed BPS:04/09 interviews were completed during the early response phase. Approximately 18 percent of all interviews were completed during the production phase, and the remaining 32 percent were completed during the nonresponse conversion phase. Response, by phase of data collection, is shown in figure 10.

Figure 10. Percentage of completed interviews, by data collection phase: 2009

NOTE: Partial interviews were not included because partially completed interviews could be resumed by sample members through the end of data collection.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

The *early response phase* of data collection yielded a 40 percent response rate, with 7,470 completed interviews out of 18,610 cases (table 12). During this phase of data collection, first follow-up (BPS:04/06) interview respondents received \$30 to complete the second follow-up (BPS:04/09) student interview, and first follow-up interview nonrespondents received \$50 to complete the second follow-up interview. The next phase of data collection, the *production phase*, yielded a 25 percent response rate, with 2,760 completed interviews out of the remaining 11,140 cases. During the production phase, first follow-up interview respondents received \$20 to complete the second follow-up interview, and first follow-up interview nonrespondents received \$40 to complete the second follow-up interview. The final phase of data collection, the *nonresponse conversion phase*, yielded a 58 percent response rate, with 4,860 completed interviews out of the final remaining 8,380 cases. Respondents who completed the second follow-up interview during this last phase of data collection received either \$30 if they were first follow-up interview respondents or \$50 if they were not.

Table 12. Number of cases and percentage of completed interviews within each phase of data collection: 2009

Data collection phase	Number of cases	Completed interviews	
		Number	Percent of cases
Total	18,610	15,080	81.0
Early response phase (\$30/\$50)	18,610	7,470	40.1
Production phase (\$20/\$40)	11,140	2,760	24.8
Nonresponse conversion phase (\$30/\$50)	8,380	4,860	57.9

NOTE: Detail may not sum to totals because of rounding. Partial interviews are not included because partial status could not be assigned until the end of data collection.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Locate rates by source of address update. Address updates for the BPS:04 cohort were received from 7,910 sample members in response to the panel maintenance mailing, the parent mailing (for sample members younger than 26 years old), the advance notification mailing, or

through the BPS website. If an address update was received, the sample member was located almost 100 percent of the time and completed interviews 98 percent of the time. The parent mailing elicited the most address updates, with the other two mailings producing about equal numbers of address updates. Locating outcomes of cases for which an address update was provided are shown in table 13.

Table 13. Located and interview completion rates, by source of address update: 2009

Source of address update	Number that provided an update	Located		Interviewed	
		Number	Percent	Number	Percent
Total	7,910	7,850	99.3	7,740	97.8
Panel maintenance mailing	1,900	1,880	99.4	1,870	98.4
Parent mailing	2,990	2,960	99.0	2,900	97.0
Advance notification mailing	1,970	1,960	99.2	1,930	97.9
B&B Student website reply	1,060	1,050	99.9	1,040	98.8

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Response rates by intensive tracing method. Among the cases assigned to intensive tracing, TOPS-1 and TOPS-2, approximately 63 percent were located. Of those cases located through intensive tracing, about 56 percent completed the BPS:04/09 interview (table 14).

Table 14. Located and interviewed rates of cases requiring intensive tracing, by intensive tracing method: 2009

Intensive tracing method	Total	Located		Interviewed	
		Number	Percent of total cases	Number	Percent of located cases
Total	3,180	2,010	63.2	1,130	56.3
TOPS-1	3,180	1,910	60.1	1,080	56.7
TOPS-2 ¹	440	210	47.4	110	51.4

¹ TOPS-2 cases are those that could not be located or interviewed through TOPS-1.

NOTE: Detail may not sum to totals because of rounding. TOPS = tracing operations.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Locate rates by other locating methods. Although no significant locating outcomes were achieved through the use of social networking sites, 60 percent of the 7,060 cases traced with Experian and FastData batch searches were located. Experian MetroNet batch searches confirmed or provided new contact information for 3,620 cases. More than one-third of the cases sent through the Experian credit header searches and the FastData Superphone search were located. Results of these other locating methods are summarized in table 15.

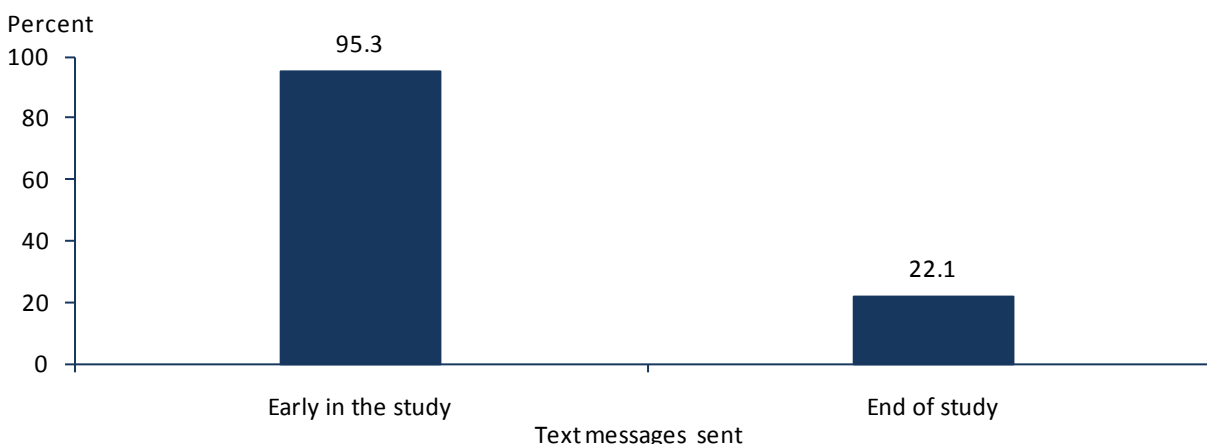
Table 15. Locate rates, by other locating methods: 2009

Tracing source	Cases traced	Located	
		Number	Percent of cases traced
Total	7,060	4,200	59.5
Experian MetroNet batch searches	5,420	3,620	66.8
Experian credit header searches	1,020	370	36.5
FastData Superphone search	620	210	33.4

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Of the 130 sample members who received an early text message notifying them that data collection had begun, 95 percent completed the interview (figure 11). These were sample members who had requested a text notification reminder of the start of data collection on their address updates. Near the end of data collection, text messaging was again employed as an additional means of contact for sample members who had become difficult to reach by other contacting methods and for whom there was a cell phone number on record. Of the 1,530 cases sent a text message near the end of data collection, 22 percent completed the interview.

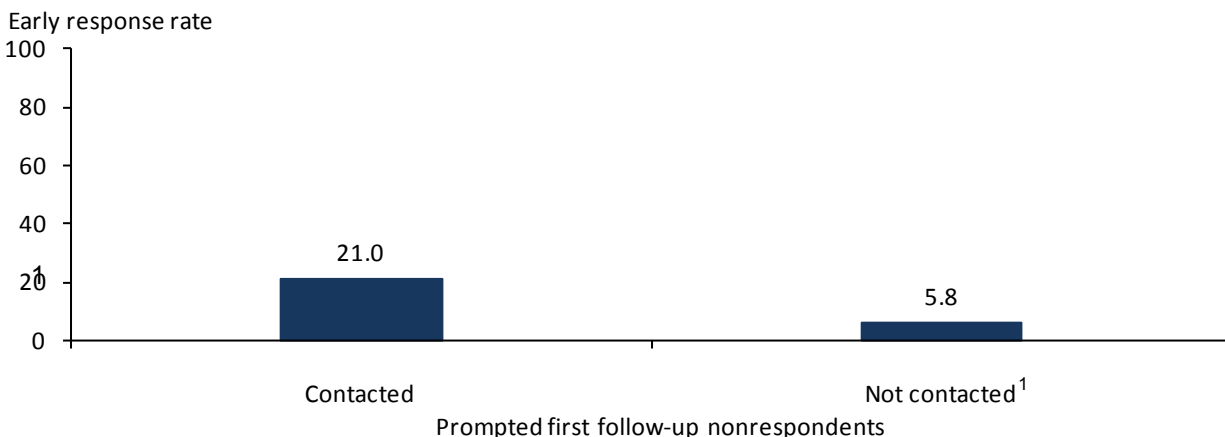
Figure 11. Interview completion rates, by timing of text messages: 2009

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Prompting response rates. First follow-up (BPS:04/06) interview nonrespondents were selected to receive prompting calls to complete the web interview during the early response phase of the second follow-up (BPS:04/09) data collection. Of the 3,720 first follow-up interview nonrespondent cases, 72 percent of the cases, or 2,680 cases, were flagged for prompting. The remaining 1,040 first follow-up interview nonrespondent cases were not flagged for prompting because of either invalid telephone numbers or because a second follow-up interview was completed prior to the start of prompting. Prompting calls began 10 days after the start of data collection, and 1,540 of the cases were prompted. The response rate during the early response phase of data collection was significantly higher for sample members spoken to directly in a prompting call (21 percent), compared with sample members who received a prompting call but who were not spoken to directly (6 percent; $z = 7.99, p < .001$). A sample member was considered *not contacted* when someone other than the sample member was spoken to or when the call was directed to an

answering machine or voice mail. The response rates during the early response phase of data collection for first follow-up interview nonrespondents who were reached directly when prompted versus those who were not contacted are compared in figure 12.

Figure 12. Early response rates for first follow-up interview nonrespondents who were prompted: 2009



¹ A sample member was considered *not contacted* when someone other than the sample member was reached or the call was directed to an answering machine or voice mail.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Response rates for field cases. Beginning about 4 months into data collection, 1,430 cases identified as difficult to locate but whose last known address was in a selected field cluster were assigned to field data collection. Sixty-three percent of these cases were located, and 54 percent completed the interview in one of the three available modes (web, telephone, or field). Of the completed cases originally assigned to the field, 170 (22 percent) were actually completed by web, or by telephone through the call center, instead of through field efforts.

Results by first follow-up (BPS:04/06) interview response status and NPSAS institution type are also presented for these cases. Nearly 63 percent of the first follow-up interview respondent cases assigned to the field completed the second follow-up (BPS:04/09) interview, compared with 47 percent of the first follow-up interview nonrespondent cases assigned to the field who completed the second follow-up interview.

Response rates among cases assigned to the field also varied by sample members' NPSAS institution type. The largest number of cases assigned to the field for any one institution type, 580 cases, was for sample members whose NPSAS institution was a public 2-year institution; these cases yielded a response rate of 57 percent. Only 60 cases were assigned to the field for sample members from public less-than-2-year schools; these cases yielded a response rate of 43 percent. Table 16 shows locate and response rates among the field cases.

Table 16. Located and completed field interview cases, by first follow-up response status and institution type: 2009

First follow-up response status and institution type	Number assigned to field	Located		Number completed interviews			Percent completed interviews		
		Number	Percent	Field	Web or help desk	All modes	Field	Web or help desk	All modes
Total	1,430	900	63.0	610	170	780	42.8	11.5	54.4
First follow-up response status									
Respondent	650	460	70.3	300	110	410	46.6	16.2	62.8
Nonrespondent	780	440	56.8	310	60	370	39.7	7.6	47.3
Institution type									
Public									
Less-than-2-year	60	30	47.6	20	10	30	31.7	11.1	42.9
2-year	580	380	65.5	270	60	330	45.9	10.9	56.8
4-year non-doctorate-granting	80	50	61.7	30	10	40	35.8	16.0	51.9
4-year doctorate-granting	80	60	73.3	30	10	40	40.0	17.3	57.3
Private nonprofit									
2-year-or-less	60	30	55.9	20	10	30	40.7	10.2	50.8
4-year non-doctorate-granting	90	60	68.2	30	20	40	31.8	18.8	50.6
4-year doctorate-granting	60	40	75.0	20	10	30	35.7	16.1	51.8
Private for-profit									
Less-than-2-year	270	160	57.0	130	20	150	46.0	7.7	53.7
2 years or more	160	100	61.5	70	20	90	44.7	10.6	55.3

NOTE: Detail may not sum to totals because of rounding. Sample members were still able to access the web instrument and call the help desk to complete a telephone interview once a case was sent to the field.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.4.2 Interview Timing Burden

Several analyses for the BPS:04/09 interview assessed the timing burden on respondents completing the interview. These analyses included computation of the overall average time it took respondents to complete the interview and the time it took respondents to complete the interview based on mode of administration (web, telephone, or field) and analysis of whether particular respondent characteristics, such as employment status, were related to interview timing burden.

To calculate the time it took to complete the interview, two time stamps were embedded on each form (web screen) of the interview. A start timer recorded the clock time on the respondent's or interviewer's computer when each form was first displayed. An end timer recorded the clock time on the respondent's or the interviewer's computer when the *Next* button on each form was clicked. From the two time stamp variables, an on-screen time and a transit time were calculated. The on-screen time was calculated by subtracting the start time from the end time for each form that the respondent saw. The transit time was calculated by subtracting the end time of the preceding form from the start time of the next form. Total on-screen time and total transit time were calculated for all respondents by summing all of the on-screen times for each screen received and summing all of the transit times for each respondent. Total instrument time was then calculated by summing a respondent's total on-screen and total transit times.

The timing analysis included only cases that completed the full-scale interview in one session. Partially completed interviews and those interviews completed in multiple sessions (i.e., those cases that logged out from an incomplete interview and later resumed their interviews) were excluded from the analysis.

The average overall interview time was calculated by summing the respondents' interview completion times and dividing the result by the total number of respondents. On average, the BPS:04/09 interview took 19.6 minutes to complete. Web interviews took 19.4 minutes to complete, field interviews took 19.6 minutes to complete, and telephone interviews took 20.2 minutes to complete.

Average section completion times were 1.3 minutes for the Front End (introductory section), 4.1 minutes for Enrollment History, 4.5 minutes for Enrollment Characteristics, 6.1 minutes for Employment, and 4.1 minutes for Background. Notably, between web and telephone modes, the Enrollment History section took longer in web mode than telephone mode ($t(6,700) = 2.79, p < .01$), as did the Enrollment Characteristics section ($t(8,060) = 7.79, p < .001$), but the Background section took longer in telephone mode than in web mode ($t(11,480) = 22.06, p < .001$). Table 17 shows the average interview time overall, for each section, by mode of administration.

Table 17. Average time in minutes to complete interview section, by mode of administration: 2009

Interview section	All respondents		Mode of administration					
			Web		Telephone		Field	
	Number of cases	Average time	Number of cases	Average time	Number of cases	Average time	Number of cases	Average time
Total interview	11,780	19.64	7,780	19.39	3,700	20.15	290	19.65
Front End	11,480	1.27	7,780	0.94	3,700	1.98	†	†
Enrollment History	11,780	4.08	7,780	4.15	3,700	3.97	290	3.38
Enrollment Characteristics	11,780	4.45	7,780	4.61	3,700	4.17	290	3.96
Employment	8,600	6.06	5,340	6.08	2,970	6.09	290	5.51
Background	11,780	4.13	7,780	3.88	3,700	4.60	290	4.96

† Not applicable.

NOTE: The timing analysis included only cases that completed the interview in one session; partial interviews were excluded. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Interview time by interview path. The time it took respondents to complete the BPS:04/09 interview varied by the number of schools attended as of the last follow-up in 2006 and by whether respondents were employed because more questions were asked of those respondents who attended more than one school and who had jobs.

The Enrollment History section collected information about the respondent's enrollment and degree attainment since the last follow-up in 2006 (for more about the interview design and topics covered in each interview section, see section 3.1.1). The average time it took all respondents to complete this section was 4.1 minutes. Because the interview collected information on each school attended since 2006, respondents with more schools spent more time in this section.

The Enrollment Characteristics section collected information about the respondent's experiences since 2006 while enrolled as an undergraduate. Topics focused on major or field of study, grade point average, employment while enrolled, and financial aid. This section took an average of 4.5 minutes to complete. Respondents who had no additional schools since 2006 took an average of only 1.8 minutes in this section because they had no additional undergraduate enrollment since the base-year study on which to report. Table 18 shows the average interview time to complete the enrollment sections by the number of schools attended.

Table 18. Average time in minutes to complete enrollment sections, by number of schools attended: 2009

Number of schools attended since 2006	Number of cases	Average completion time	
		Enrollment History	Enrollment Characteristics
None	3,480	0.87	1.84
One	7,210	4.98	5.57
Two	1,090	8.37	5.45

NOTE: The timing analysis included only cases that completed the interview in one session; partial interviews were excluded. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Respondents took an average of 6 minutes in the employment section to report on job items such as their job title and duties, benefits, earnings, level of satisfaction, and any periods of unemployment. Respondents who were employed spent 7.4 minutes in the employment section,

compared with those respondents who were not employed, who spent 1.6 minutes in the employment section.

Timing of abbreviated interview. The abbreviated version of the BPS:04/09 interview included the Front End, Enrollment History, and Enrollment Characteristics sections of the interview. On average, the BPS:04/09 abbreviated interview took 10.5 minutes. Overall, web abbreviated interviews took 11.3 minutes and were significantly longer than telephone abbreviated interviews, at 10.5 minutes ($t(1,120) = 2.0, p < .05$), and field abbreviated interviews, at 8.9 minutes ($t(620) = 4.2, p < .001$). Also, telephone abbreviated interviews were significantly longer than field abbreviated interviews ($t(830) = 3.1, p < .01$). Table 19 shows the average abbreviated interview time overall, for each section, and by interview completion mode.

Table 19. Average time in minutes to complete abbreviated interview, by interview section and mode of administration: 2009

Interview section	All respondents		Mode of administration					
			Web		Telephone		Field	
	Number of cases	Average time	Number of cases	Average time	Number of cases	Average time	Number of cases	Average time
Total interview	1,290	10.54	460	11.26	670	10.49	170	8.85
Front End	1,120	1.9	460	1.17	670	2.4	†	†
Enrollment History	1,290	3.5	460	3.61	670	3.53	170	3.06
Enrollment Characteristics	1,290	4.29	460	4.69	670	4.15	170	3.74
Employment	†	†	†	†	†	†	†	†
Background	†	†	†	†	†	†	†	†

† Not applicable.

NOTE: The timing analysis included only cases that completed the interview in one session; partial interviews were excluded. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.4.3 Telephone Interviewer Hours

During the course of BPS:04/09 data collection, 15,195 telephone interviewer hours were logged, for an average of 3.09 hours spent by telephone interview staff per completed telephone interview. Because, on average, telephone interviews took 20.2 minutes to administer, most of the telephone interview hours were spent on case management activities such as locating and contacting sample members, prompting sample members to complete interviews, reviewing call history, scheduling callbacks, entering detailed comments and suggestions to assist with reaching and interviewing sample members, and responding to incoming help desk calls.

3.4.4 Number of Calls to Sample Members

On average, 16 calls were made per BPS:04/09 sample member during the interviewing period, except for in the early response phase when no outbound calls were made to sample members. The average number of calls per sample member varied according to the sample member's first follow-up (BPS:04/06) interview response status and second follow-up (BPS:04/09) interview response status, mode of administration, and the phase of data collection. First follow-up interview respondents received 7 fewer calls, 15 calls on average, than first follow-up interview nonrespondents who received 22 calls on average ($t(5,305) = 15.01, p < .001$). Cases that completed a second follow-up interview received an average of 11 calls, while second follow-up interview nonrespondents received an average of 42 calls during the interviewing period.

There were also call count differences depending on mode of interview administration. Overall, respondents who completed interviews over the telephone required more calls than respondents who completed interviews over the web, an average of 18 calls, compared with 7 calls ($t(8,240) = 35.46, p < .001$). However, when early response phase interview completes were excluded, web respondents required more calls than telephone respondents, an average of 24 calls, compared with 18 calls ($t(5,144) = 13.23, p < .001$). The average number of telephone calls is shown in table 20.

Table 20. Average number of calls, by response status and data collection phase: 2009

Response status and data collection phase	Number of cases	Number of calls	Average number of calls
Total	18,610	302,500	16.3
First follow-up interview response status			
Respondent	14,900	221,340	14.9
Nonrespondent	3,720	81,150	21.8
Second follow-up interview response status			
Respondent	15,160	158,730	10.5
Web interviews	9,630	64,060	6.7
Excluding early response	2,670	63,960	23.9
Telephone interviews	4,920	86,760	17.6
Field interviews	610	7,910	12.9
Nonrespondent and exclusions	3,450	143,770	41.7

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.5 Evaluation of Student Interview Items

An evaluation of the BPS:04/09 student interview items included analyses of the data collected in the instrument coders and a review of help text access rates, success rates for conversion text, and item nonresponse.

3.5.1 Instrument Coders

Assisted coding systems were used to standardize the collection of data on, and to code, any postsecondary schools attended, major or field of study, and occupation. Text strings were collected from the respondent, and then a keyword search of an underlying database was conducted, allowing the respondent to select the best option from a list of possible options returned. An assisted coding system was not used to code industries, but ready industry definitions allowed respondents and interviewers to select an industry classification from among a list of standardized options (for a detailed description of each coder, see section 3.1.1).

Recoding. Ten percent of the major, occupation, and industry codes chosen in the student interviews were randomly selected to be reviewed by expert coding staff for *recoding*.¹⁴ Expert coders assessed the accuracy of codes chosen in the interview based on the text string provided by the respondent to review data and to provide information for improving instrument coders for future

¹⁴ Recoding of institution codes selected in the postsecondary school coders was not done because text strings provided by respondents would presumably have directly matched school name codes chosen. In the major, occupation, and industry coders, text strings provided by respondents and standardized names of codes in the database were often not direct matches.

studies. Across modes of administration and across coders, expert coding staff generally agreed with the codes chosen for text strings in the interview. Overall, expert coders agreed with major, occupation, and industry codes chosen in the interview 92 percent of the time, recoded codes chosen to a new value about 7 percent of the time, and were unable to choose a code based on too vague a text string about 1 percent of the time.

Only the industry coder showed significant differences in recode rates between modes of administration. Expert coders agreed with industry codes chosen by web respondents 72 percent of the time and with those chosen by interviewers 92 percent of the time ($\chi^2 = 7.28, p < .001$). Expert coders recoded industry codes chosen by web respondents 23 percent of the time and recoded those chosen by telephone and field interviewers 7 percent of the time ($\chi^2 = 6.18, p < .001$). Industry text strings provided by web respondents were too vague to code 5 percent of the time, while industry text strings from web and field interviews were too vague to code 1 percent of the time ($\chi^2 = 3.51, p < .001$). Table 21 shows the rate of recoded values—same as original code, recoded to different value, or text string too vague to code—chosen by the expert coders for the major, occupation, and industry codes in the interview.

Table 21. Summary of recoding results, by coder type and administration mode: 2009

Coding system	Percent of recoded values					
	Recoded same as original		Recoded to different value		Text string too vague to code	
	Web	Telephone and field	Web	Telephone and field	Web	Telephone and field
Major	97.9	98.0	1.6	2.0	0.5	#
Occupation	90.2	92.9	9.0	6.9	0.8	0.2
Industry	72.3	91.7	22.7	7.4	4.9	0.9

Rounds to zero.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Upcoding. In a process known as *upcoding*, project staff chose an appropriate code for any text strings provided by respondents or interviewers for which a code was not selected in the IPEDS, major, occupation, and industry instrument coders. Text strings from web interviews generally required more upcoding than text strings from telephone and field interviews because interviewers received special training on coders. Results of the upcoding process are shown in table 22.

Table 22. Summary of upcoding results, by coding system and administration mode: 2009

Coding system	Percent of text strings upcoded		
	Overall	Web	Telephone and field
IPEDS institutions	3.8	3.9	3.7
Major	2.6	3.4	0.6
Occupation	3.7	5.2	0.9
Industry	1.9	2.9	0.1

NOTE: IPEDS = Integrated Postsecondary Education Data System.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.5.2 Help Text

Respondents or interviewers were able to click on a help button provided on each BPS:04/09 interview screen for both general instrument and question-specific help. The general instrument help provided answers to FAQs about web browser settings and response types (i.e., how to respond using a check box, dropdown box, or radio button). The question-specific help provided definitions of key terms and phrases used in question wording and response options and also provided any other explanations thought to help clarify and standardize the meaning of questions for respondents.

The number of times that respondents or interviewers clicked the help button on each screen relative to the number of respondents who were administered the question determined the rate of help text access for that screen. The screen-level rate of help text access was analyzed overall and by mode of interview administration to identify screens that may have been problematic for users. For forms administered to at least 50 respondents, the overall mean rate of help text hits per screen was less than 1 percent. Help text was accessed 2 percent of the time during interviews by telephone and field, compared with 1 percent of the time by web respondents ($\chi^2 = 12.49, p < .001$).

The interview question asking respondents for their employer's primary industry (item name MDINDCD) had the highest overall rate of help text access, at 7 percent. The help text for this question was accessed 19 percent of the time by telephone and field interviewers, compared with less than 1 percent of the time by web respondents ($\chi^2 = 29.96, p < .001$). It is worth noting here that interviewers were encouraged as part of their training to refer to the help text on this item when respondents showed hesitation in understanding the term "industry."

Table 23 shows the interview questions with the highest rates of help text access; these were questions administered to at least 50 respondents and for which help text was accessed at a rate of at least 2 percent.

Table 23. Interview questions with highest rates of help text access, by administration mode: 2009

Question name	Description of question	Overall		Web		Telephone and field	
		Number administered to	Percent of help text access	Number administered to	Percent of help text access	Number administered to	Percent of help text access
MCCLTYA	Type of class	800	3.1	450	0.2	350	6.9
MCLNINL	Loan influenced enrollment plans	4,630	2.2	2,610	0.0	2,030	5.1
MCLNTYA	Type of undergraduate loan	8,080	3.0	5,390	0.0	2,690	8.9
MCUGYR	Undergraduate level during most recent term	1,480	2.4	750	0.3	730	4.5
MDCURTYP	Type of employer	7,670	3.2	5,040	0.0	2,630	9.4
MDINDCD	Industry coder	6,700	6.8	4,370	0.1	2,340	19.4
MDNTCAA	Job description	2,480	3.0	1,540	0.0	940	7.9

NOTE: Detail may not sum to totals because of rounding. Table is based on the rates of help text access for interviewer screens administered to a minimum of 50 respondents and in which help text was accessed at an overall rate of at least 2 percent.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.5.3 Conversion Text

Eight questions in the interview were considered *critical*; that is, responses to these questions were especially important to the study and high rates of missing data on these questions would

impact the quality of these data. When respondents did not provide an answer to these questions and the *Next* button was clicked on the interview screen, then conversion language (or *conversion text*) appeared above the question to encourage a response. Interviewers were asked to read conversion text to respondents and then to reread the interview question. The conversion text attempted to relay the importance of that particular question to the study and emphasized the confidential nature of responses. Some critical questions also displayed a *don't know* response option for respondents once the conversion text was triggered.

Dividing the total number of responses to the critical questions after the conversion text was displayed by the total number of cases where the conversion text was triggered provided a conversion rate for the questions that was attributed to the conversion text. Overall, conversion text was triggered in the student interview approximately 930 times throughout data collection. Seventy-six percent, or 700, of these cases were converted to a response after the conversion text was displayed. The web interviews accounted for 600 of the 930 cases where conversion text was triggered and 510 of the 700 converted cases. The remaining cases where conversion case was triggered were in telephone and field interviews. The rate of conversion as measured by the triggering of conversion text was 85 percent in web interviews, compared with 59 percent in telephone and field interviews ($\chi^2 = 8.67, p < .001$). There was not a way to measure conversion to a response by telephone and field interviewers before conversion text was triggered.

Conversion text was triggered more than 100 times for three interview questions. *Enrollment through June 2009* (MBDAT01), which asked sample members to provide their months of postsecondary enrollment for the period from July 2006 through June 2009, triggered conversion text in 330 cases and yielded a conversion rate of 72 percent. Web cases were converted at a rate of 86 percent, compared with telephone and field cases, which were converted at a rate of 50 percent ($\chi^2 = 7.24, p < .001$). *Monthly rent or mortgage payment amount* (MEMTGAMT) triggered conversion text in 320 cases, with a conversion rate of 75 percent. Web cases were converted at a rate of 88 percent, compared with telephone and field cases, which were converted at a rate of 44 percent ($\chi^2 = 8.23, p < .001$). *Any undergraduate loans* (MCUGLN) triggered conversion text in 130 cases and produced a conversion rate of 85 percent, with no significant mode difference. Table 24 displays the rates of conversion for all eight items in the interview with conversion text. Conversion rates were examined overall and by mode.

Table 24. Conversion rates for critical items, by mode of administration: 2009

Item	Item description	Number of cases	Number converted	Total percent converted	Percent converted to a valid response	Percent converted to a "don't know"
Total						
MBDAT01	Enrollment through June 2009	330	240	72.4	72.4	†
MCGAPEST	Estimate of GPA	60	50	76.3	67.8	8.5
MCNUMJOB	Number of jobs during last term of enrollment	20	20	94.7	94.7	†
MCUGLN	Any undergraduate loans	130	110	84.9	80.2	4.8
MDJSTAT	Currently employed	20	20	90.0	90.0	†
MECITZN	Citizenship status	10	10	71.4	71.4	†
MECRDUSE	Have credit cards	50	30	69.6	69.6	†
MEMTGAMT	Monthly rent or mortgage payment amount	320	240	74.9	59.6	15.4
Web						
MBDAT01	Enrollment through June 2009	210	180	86.3	86.3	†
MCGAPEST	Estimate of GPA	40	30	78.0	73.2	4.9
MCNUMJOB	Number of jobs during last term of enrollment	10	10	92.9	92.9	†
MCUGLN	Any undergraduate loans	70	60	81.1	78.4	2.7
MDJSTAT	Currently employed	10	10	85.7	85.7	†
MECITZN	Citizenship status	#	#	66.7	66.7	†
MECRDUSE	Have credit cards	30	20	66.7	66.7	†
MEMTGAMT	Monthly rent or mortgage payment amount	220	200	87.9	70.1	17.9
Telephone and field						
MBDAT01	Enrollment through June 2009	130	60	49.6	49.6	†
MCGAPEST	Estimate of GPA	20	10	72.2	55.6	16.7
MCNUMJOB	Number of jobs during last term of enrollment	10	10	100.0	100.0	†
MCUGLN	Any undergraduate loans	50	50	90.4	82.7	7.7
MDJSTAT	Currently employed	10	10	100.0	100.0	†
MECITZN	Citizenship status	#	#	75.0	75.0	†
MECRDUSE	Have credit cards	20	10	75.0	75.0	†
MEMTGAMT	Monthly rent or mortgage payment amount	100	40	44.2	34.7	9.5

† Not applicable.

Rounds to zero.

NOTE: Detail may not sum to totals because of rounding. GPA = grade point average.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.5.4 Item Nonresponse

Rate of nonresponse was a data quality measure used to identify troublesome interview items and better understand the experiences of sample members in completing the interview. Total nonresponse rates were calculated for items with missing data (including *don't know* responses) that

were administered to at least 100 respondents. Overall, the item-level nonresponse analysis yielded 19 items, out of 385 interview items, with more than 5 percent missing data.¹⁵

Income questions returned relatively high rates of nonresponse.¹⁶ The item with the highest rate of nonresponse was *spouse's income estimate for 2008* (MEINSRA). Of the 250 respondents who received this item, approximately 43 percent did not provide an estimate of their spouse's income. In addition, there were several postbaccalaureate degree questions and items on coders among those items with nonresponse rates greater than 5 percent. Fifteen percent of respondents did not enter a text string for their job duties in the occupation coder item (MDJBDY), and 21 percent did not enter a text string for their employer's industry in the industry coder item (MDIND).

Item-level nonresponse rates were also examined by mode of administration. There were significant differences between the web mode and interviewer (telephone and field) modes in the nonresponse rates of 15 interview items. Notably, the following income and debt items showed higher rates of nonresponse among telephone and field respondents than among web respondents: *respondent income in 2008* (MEINCOM; $\chi^2 = 6.42, p < .001$); *spouse's income in 2008* (MEINCSP; $\chi^2 = 5.26, p < .001$); *spouse's income estimate for 2008* (MEINSRA; $\chi^2 = 2.12, p < .05$); *balance due on all credit cards* (MECRDBAL; $\chi^2 = 3.41, p < .001$); *spouse's total student loan amount* (MESPAMT; $\chi^2 = 9.28, p < .001$); and *amount of spouse's loans still owed* (MESPOWE; $\chi^2 = 6.90, p < .001$).

In contrast, the following items on coders showed higher rates of nonresponse among web respondents than among telephone and field respondents: *primary major: string* (MCMAJ1; $\chi^2 = 17.84, p < .001$); *secondary major: string* (MCMAJ2; $\chi^2 = 6.26, p < .001$); *job duties* (MDJBDY; $\chi^2 = 20.54, p < .001$); *industry: string* (MDIND; $\chi^2 = 16.27, p < .001$). Table 25 summarizes the item-level nonresponse for items administered to at least a 100 respondents with a rate of at least 5 percent missing.

¹⁵ Partial and abbreviated interview completions and missing data for interview nonrespondents were excluded from this analysis.

¹⁶ Results of item nonresponse in this section apply only to BPS:04/09 respondents and are not weighted by the BPS analysis weight. Chapter 6 provides additional details on the item nonresponse, the potential bias due to item nonresponse, and the impact of the item imputation which was used to fill in missing data to reduce item nonresponse bias.

Table 25. Interview items with highest nonresponse rates, by mode of administration: 2009

				Mode of administration					
				Overall		Web		Telephone and field	
				Number administered to	Percent missing	Number administered to	Percent missing	Number administered to	Percent missing
Item	Item description								
Enrollment History									
MBEN803	Intensity of enrollment 2008 at school 3	140	6.6	110	6.3	30	7.7		
MBCRGR02	Currently enrolled in postbaccalaureate program 2	130	7.6	110	6.1	20	16.7		
MBDGGR02	Type of postbaccalaureate degree or certificate program 2	170	7.3	150	5.5	20	20.0		
MBTIGR02	Enrollment intensity in postbaccalaureate program 2	170	6.1	150	4.1	20	20.0		
MBMRGR02	Enrolled for any other postbaccalaureate degrees or certificates 2	170	6.1	150	4.8	20	15.0		
Enrollment Characteristics									
MCMAJ1	Primary major: string	9,750	8.6	7,190	11.6	2,560	0.1		
MCMAJ2	Secondary major: string	1,620	6.4	1,180	8.7	450	0.2		
Employment									
MDJBDY	Job duties	7,740	14.7	5,090	20.6	2,650	3.2		
MDIND	Industry: string	6,680	21.3	4,350	27.3	2,330	10.2		
MDJOBYR	Years in same or similar job	7,740	6.6	5,090	7.7	2,650	4.4		
MDJOBMM	Months in same or similar job	7,740	14.4	5,090	15.5	2,650	12.1		
Background									
MEINCOM	Respondent income in 2008	13,600	8.2	9,090	7.1	4,510	10.3		
MEINEST	Respondent income estimate for 2008	1,110	17.7	650	20.1	470	14.4		
MEINCSP	Spouse's income in 2008	3,060	8.1	1,830	6.0	1,230	11.3		
MEINSRA	Spouse's income estimate for 2008	250	43.0	110	35.5	140	48.9		
MECRDBAL	Balance due on all credit cards	4,410	5.0	3,190	4.3	1,220	6.8		
MESPAMT	Spouse's total student loan amount	1,070	9.0	750	3.6	330	21.2		
MESPOWE	Amount of spouse's loans still owed	1,070	6.2	750	2.8	330	13.8		

NOTE: Detail may not sum to totals because of rounding. This table includes only those items that were administered to at least 100 respondents.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

3.6 Student Interview Conclusions

BPS:04/09 interviews were conducted from February 24, 2009, to October 12, 2009. Of the 18,610 sample members in the BPS:04 cohort, 16,920, or 91 percent, were successfully located. Successful locating methods included batch searches, such as Telematch and CPS, and address update information provided by both sample members and their parents. Overall, about 17 percent of sample members required intensive tracing, and 63 percent of these cases were located. New locating methods attempted during the BPS:04/09 interview included text message reminders and the use of social networking sites. While the use of social networking sites was abandoned as a means to contact sample members, approximately 22 percent of those sample members who received a reminder text message near the end of data collection responded to the interview.

Of the 18,610 sample members in the BPS:04 cohort, 15,160, or 82 percent, completed a full, abbreviated (English or Spanish), or partial interview. About 90 percent of all second follow-up (BPS:04/09) interview respondents completed the full interview. Sixty-four percent of interviews were completed on the Web, 32 percent of interviews were completed by telephone, and 4 percent

were completed in field interviewing. Eighty-seven percent of first follow-up (BPS:04/06) interview respondents completed the second follow-up interview, compared with 61 percent of first follow-up interview nonrespondents. Half of all completed second follow-up interviews and almost three-fourths of web interviews were completed during the early response phase. Sample members who completed the interview during the early response phase received either \$30 (first follow-up interview respondents) or \$50 (first follow-up interview nonrespondents).

On average, the BPS:04/09 interview took 19.6 minutes to complete. Overall, web interviews were significantly shorter at 19.4 minutes than telephone interviews were at 20.2 minutes, but not significantly shorter than field interviews were at 19.6 minutes. The telephone interviews were not significantly longer than the field interviews. Average section completion times were 1.3 minutes for the Front End, 4.1 minutes for Enrollment History, 4.5 minutes for Enrollment Characteristics, 6.1 minutes for Employment, and 4.1 minutes for Background. On average, the BPS:04/09 abbreviated interview took 10.5 minutes.

An evaluation of the quality of the data provided by the BPS:04/09 student interview showed that methodological features built into the instrument as well as training and supervision of interviewing staff aided in the successful administration of the interview. The design of assisted coding systems in the instrument and the training of interviewers on coders appeared successful. Overall, expert coders agreed with major, occupation, and industry codes chosen in the interview 92 percent of the time, recoded codes chosen to a new value about 7 percent of the time, and were unable to choose a code based on too vague a text string about 1 percent of the time. Only 3 percent of text strings provided in the interview lacked a code and required upcoding. The appearance of help text and conversion text in the instrument also appeared to improve question response. Help text was accessed significantly more often during interviews by telephone and field interviewers than by web respondents. It should be noted that interviewers had been encouraged to use help text, as needed, as this feature of the instrument was emphasized during telephone interviewer training. Seventy-six percent of the cases where conversion text was triggered in the interview were converted to a response after the conversion text was displayed. Overall, the item-level nonresponse analysis yielded 19 items out of 385 interview items with more than 5 percent missing data.

Debriefing of tracers and field interviewers at the end of data collection indicated that frequent monitoring of telephone interviewers, a help desk that tracked and resolved difficulties encountered by sample members attempting to complete the web interview, and quality circle training and feedback meetings were useful as data collection QC procedures. Most interviewers indicated that they felt they had all the tools necessary to successfully administer the BPS:04/09 student interview.

Chapter 4.

Transcript Data Collection, Outcomes, and Evaluation

For the first time in the BPS series of studies, postsecondary transcripts were collected for a BPS cohort. As part of BPS:04/09, transcripts from all postsecondary institutions attended between July 1, 2003 and June 30, 2009 were requested for the BPS:04 cohort. To ease burden on participating institutions, the BPS:04/09 transcript collection was combined with the transcript collection for the 2008/09 Baccalaureate and Beyond Longitudinal Study under the 2009 Postsecondary Education Transcript Study (PETS:09). This chapter provides an overview of the BPS:04 portion of the transcript collection and will describe the processes and systems developed for collecting transcripts. It will also report on transcript keying and coding activities and the data and process evaluation procedures introduced to assure data quality.

4.1 Transcript Data Collection and Response Rates

A Transcript Control System (TCS) was designed to manage the transcript and other institution data requested from institutions attended by the BPS:04 cohort. Institution contactors (ICs) served as liaisons to institutions that provided the requested materials through a variety of possible submission methods, including a study website. Transcripts for a total of 16,960 students were received. The details of transcript data collection and response rates are included in this section.

4.1.1 Transcript Control System

The integrated, web-based TCS supported each step of the BPS:04/09 transcript collection, including project management, communications, and tracking. The TCS comprised several transcript management systems: the *Institution Contacting System* was used to store and access data on students and track efforts to obtain their transcripts; the *Data Receipt System* managed data received on sample members, including transcripts and catalogs for the institutions attended; and the *Keying and Coding System* (KCS) facilitated the efficient and secure capture of data from student transcripts. See section 4.2 for a detailed discussion of the development and use of the KCS. Transcript control system data were stored in SQL databases for ready access in reporting, documenting and delivering transcript data.

4.1.2 Training of Institution Contacting Staff

Institution contacting staff consisted of eight ICs and two quality control supervisors (QCS) who were responsible for staff supervision. Prior to the start of transcript data collection, the ICs were trained over a 2-day period on transcript and catalog collection, gaining cooperation, and problem resolution. Training included information on BPS and a review of confidentiality regulations. Activities focused on guidelines for interactions with institution staff, gaining cooperation, collection of catalogs and transcripts, and collection and receipt systems. During the transcript collection period, staff were briefed on their progress, asked questions, and discussed issues at weekly quality circle meetings. The IC training agenda is included in appendix G.

4.1.3 Transcript Collection Procedures

Transcripts were requested from the 3,030 eligible postsecondary institutions attended by the 18,640 BPS:04/09 sample members, including each sample member's base-year, National Postsecondary Student Aid Study (NPSAS) institution, and any additional institutions attended as reported in the first follow-up (BPS:04/06) and second follow-up (BPS:04/09) student interviews or noted on other transcripts collected during the study. In addition, if an institution had copies of transcripts received from any transfer schools attended by the BPS sample member, the transfer transcripts were requested as well.

Transcript data collection comprised two phases. Phase 1 began in November 2008 collecting transcripts requested from each student's NPSAS institution and from any additional institutions students reported attending in the first follow-up (BPS:04/06) student interview. Phase 2 began in October 2009 after completion of the second follow-up (BPS:04/09) student interview. Phase 2 transcripts were requested based on additional enrollment reported in that interview. Additionally, in early 2010, transcript requests were made of any transfer institutions identified on collected transcripts. In the phase 2 requests, institutions were also asked to provide updates for incomplete grades noted on previously collected transcripts.

At the start of the transcript collection, a transcript request packet was sent to the director of the institutional research office at each institution. In the absence of an office of institutional research, packets were sent to the registrar's office. The packet contained notification materials for transcript data collection (appendix H), including the following:

- a letter introducing PETS:09,
- an introductory letter from the National Center for Education Statistics (NCES);
- a letter of endorsement from the American Association of Collegiate Registrars and Admission Officers (AACRAO);
- a list of other endorsing agencies;
- information regarding how to log on to the study's secure website;
- descriptions of and instructions for the various methods of providing transcripts; and
- excerpts from the Family Educational Rights and Privacy Act (FERPA) that illustrated the transcript collection's compliance with the legislation.

Follow-up calls by trained ICs were placed 2 days after the initial mailing to ensure receipt of the packet and to answer any questions about the study. Prompting calls were made and reminder e-mails sent, as needed, from November 2008 through February 2010.

Transcript submission. Institutions were provided the following seven options for submitting transcripts:

1. *File upload to the study website.* Institutions were asked to submit electronic transcript files, preferably in an extensible markup language (XML) or electronic data interchange (EDI) format that conformed to the Postsecondary Electronic Standards Council standard. If the transcript data were not already in one of the two preferred formats, the institution was asked to convert the files before loading, or to prepare files using the file specifications provided on the study website. The transcript files were submitted directly to the secure study website. The latest technology systems were incorporated into the

- transcript website application to ensure strict adherence to NCES confidentiality guidelines. The web server included a Secure Sockets Layer (SSL) encryption certificate and was configured to force encrypted data transmission over the Internet. All of the data entry modules on the site were password protected, and the user was automatically logged out of the system after 20 minutes of inactivity. Just as with all the submission methods, once the transcript files were received, they were immediately moved to a secure project folder accessible only to a subset of project staff.
2. *Submission of electronic transcripts by secure file transfer protocol (FTP) server.* Transcript files could be submitted using an FTP server, which ensured an encrypted control session. As with the file upload, it was preferable for files to be submitted using an XML or EDI format, but files could be submitted in virtually any file layout. After being copied to the secure project folder, the files were immediately deleted from the FTP server.
 3. *Submission of transcripts via eSCRIP-SAFE.* eSCRIP-SAFE is a third-party vendor that receives and electronically converts transcripts to PDF files, then stores them on a secure server. Institutions registered with this service send data by secure internet connection to the eSCRIP-SAFE server, where they can be downloaded only by a designated user. The electronic transcript files downloaded by project staff from eSCRIP-SAFE were saved only to the secure project folder.
 4. *Submission of transcript files as encrypted attachments to e-mail.* Electronic transcript files could be emailed as attachments to the project e-mail account. Guidelines on encryption and creating strong passwords for transcript attachments were provided to the institutions. Encrypted transcript files were moved to the secure project folder and deleted from the e-mail folder immediately.
 5. *Submission of transcript files through a dedicated server at the University of Texas at Austin.* A dedicated server at the University of Texas at Austin, developed to allow transcript exchange among registered institutions, was provided as an option to institutions submitting transcripts to the study. The server supported both XML and EDI formats.
 6. *Submission of transcripts via secure electronic fax.* Transcripts were accepted via secure electronic fax. To safeguard against information being misdirected or intercepted by individuals for whom access was not intended or authorized, RTI protocol only allowed for transcripts to be sent to an e-fax server housed in a secured data center at RTI. The transcript data were stored on the server as electronic (PDF) files. To ensure confidentiality, institutions were asked to send a test fax with nonsensitive data and to use a specific fax cover sheet from the project website that included a confidentiality statement. After being received and copied to the secure project folder, transcript files were deleted from the e-fax server.
 7. *Submission of transcripts via FedEx.* Transcripts were accepted via FedEx when none of the other methods was manageable. To safeguard confidentiality, institution staff were instructed to redact any personally identifiable information from the transcript including student name, address, date of birth, and Social Security Number (if present). Paper transcripts were kept in a locked file cabinet in RTI's secure data receipt facility, to which only a limited number of BPS:04/09 transcript staff had access. After the paper transcripts were scanned and stored electronically, they were shredded.

In addition to transcripts, other information from each institution was needed for keying and coding. Institutions were asked to provide academic calendar and grading system information on the study website. If course catalogs could not be obtained separately through institution websites or through CollegeSource Online, a resource for over 50,000 postsecondary institution catalogs, they were requested from institutions.

Transcripts and course catalogs received were inventoried, assigned unique identifiers, reviewed for any problems with legibility and completeness, and logged each day in the data receipt system. Project staff used daily monitoring reports to review problem transcripts and ICs assisted with resolving transcript problems directly with institutions.

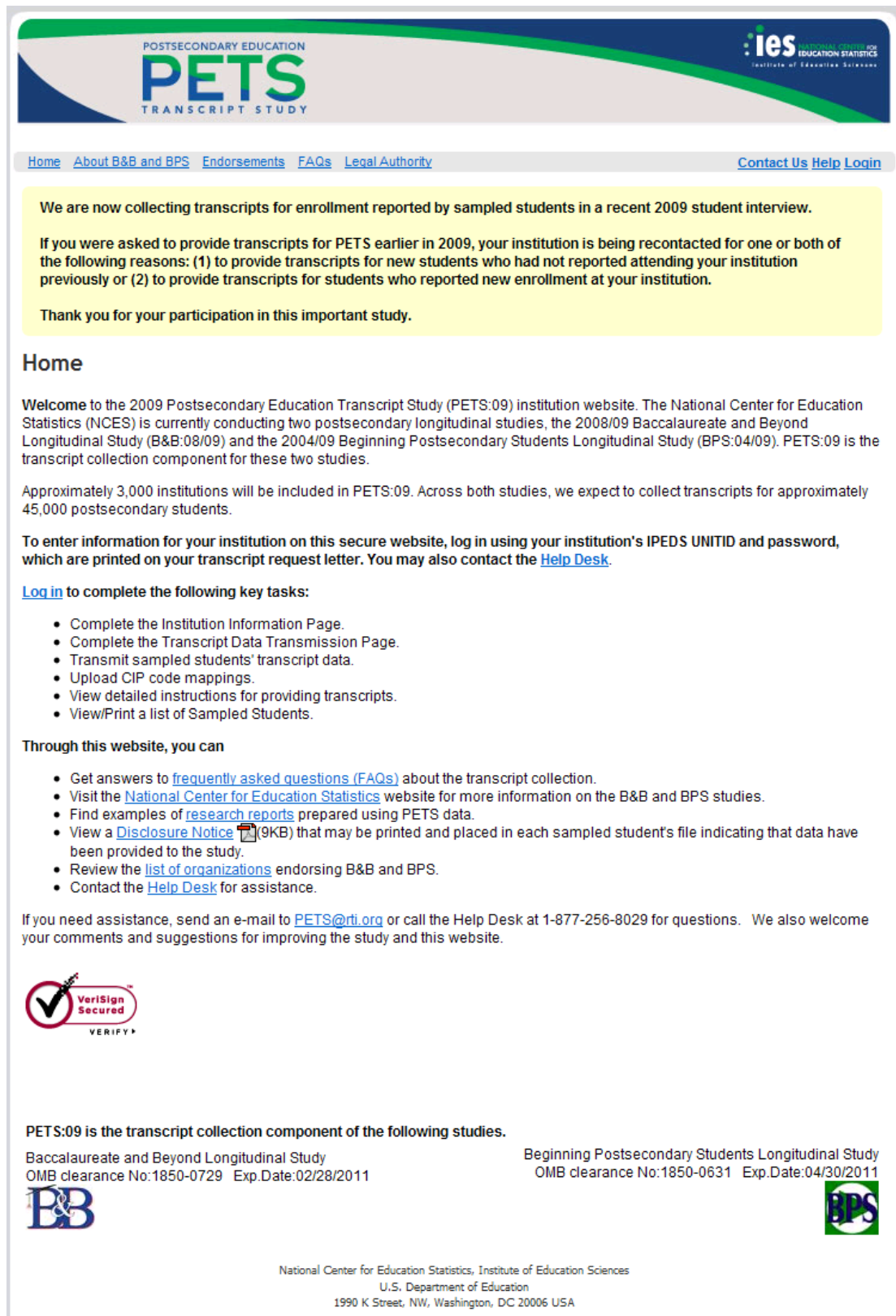
4.1.4 Institution Website

The PETS:09 website (figure 13) was the portal used to collect institution data and transcripts. The website contained information about PETS, including research topics, the transcript collection, how transcript data would be used, answers to frequently asked questions, and confidentiality assurances. Contact information for the transcript data collection help desk and project staff at RTI, as well as links to the main NCES and RTI websites, were also included on the home page. From the secure portion of the website, institutions could view the list of their sampled students, view detailed instructions for providing transcript data, and upload data.

Various systems were incorporated into the website application to ensure strict adherence to NCES confidentiality guidelines, including the following:

- a Secure Sockets Layer (SSL) Certificate ensured secure data transmission over the Internet,
- all data entry modules were password protected,
- users were automatically logged out of the system after 20 minutes of inactivity, and
- files uploaded to the secure website were immediately moved to a secure project folder accessible only to a subset of project staff.

Figure 13. Institution website home page: 2009



SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

4.1.5 Transcript Collection Response Rates

Institution-level transcript collection. Table 26 provides institution participation rates by institution type. The institution sample for the transcript collection included 3,100 distinct institutions attended by the BPS:04 cohort. Of the 3,100 institutions, it was determined that 2 percent were ineligible because the institution had closed or because a sample member had enrolled in, but never actually attended the institution. Of the remaining 3,030 institutions, 2,620 (87 percent) provided transcripts for the cohort. Across the institution types represented, participation in the transcript collection ranged from 71 percent at the private for-profit less-than-2-year institutions, to 93 percent at public 4-year doctorate-granting institutions.

Table 26. Eligible institution participation, by institution type: 2009

Institution type	Total eligible institutions	Institution-level participation ¹	
		Number	Percent
Total	3,030	2,620	86.6
Public			
Less-than-2-year	70	50	77.9
2-year	920	810	88.9
4-year non-doctorate-granting	300	270	90.4
4-year doctorate-granting	260	240	93.4
Private nonprofit			
2-year-or-less	90	80	85.9
4-year non-doctorate-granting	510	460	91.3
4-year doctorate granting	240	210	89.0
Private for-profit			
Less-than-2-year	260	180	70.5
2 years or more	390	310	78.4

¹ An institution was considered a participant if it provided a transcript for at least one student. Sixteen of the participating institutions are not represented in the institution type rows due to unknown institution type.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

As shown in table 27, institutions preferred submitting transcripts via secure fax, with about 69 percent using that method. Common reasons cited by institutions for not participating in PETS included lack of available staff to handle the request for transcripts and the timing of the transcript request.

Table 27. Institution transmission mode for transcript data: 2009

Transmission mode	Institutions	
	Number	Percent
Total	2,620	100.0
Electronic fax	1,800	68.5
Upload to study website	470	17.8
Federal Express	170	6.5
E-mail	120	4.5
Secure FTP	50	1.9
eSCRIP-SAFE™	20	0.6
University of Texas server	#	0.1

Rounds to zero.

NOTE: Detail may not sum to totals because of rounding. FTP = file transfer protocol.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Transcript-level collection. Transcripts were requested for each of the BPS:04 sample members from each of the known institutions they attended. At the transcript level, 25,120 (87 percent) of the requested transcripts were received, keyed, and coded. Additional transcripts were collected but not keyed and coded if they only contained graduate coursework, were illegible, were duplicates of received transcripts, or were transcripts for students learned to be deceased.

During phase 1, transcripts were requested from each student's NPSAS institution as well as from any additional institutions students reported attending in the first follow-up (BPS:04/06) student interview. Eighty-eight percent of the phase 1 transcripts were received. During phase 2, transcripts were requested based on additional enrollment reported in the second follow-up (BPS:04/09) interview as well as any transfer institutions identified on collected transcripts. Eighty-five percent of the phase 2 transcripts were received. In the phase 2 requests, institution staff members were also asked to provide updates to incomplete grades noted on previously-collected transcripts. In total, 575 courses with incomplete grades were identified and 173 courses (30 percent) were replaced with an updated grade.

Student-level transcript collection. At the student level, a transcript was received from at least one institution for 16,960 sample members (92 percent), and a transcript was received from the sample member's NPSAS institution, the first postsecondary institution attended, for 16,540 sample members (89 percent). A transcript was received from each institution attended for 16,110 sample members (87 percent). Table 28 shows the transcript collection results at the student level.

Table 28. Student-level transcript collection results: 2009

Student sample	Number	Percent
Total	18,640	100.0
Transcript respondents ¹	16,960	91.5
NPSAS transcript received	16,540	89.2
All student's transcripts received	16,110	86.9
Transcript nonrespondents	1,580	8.5

¹ A student was considered a transcript respondent if we received a transcript from one or more institutions.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

4.2 Transcript Keying and Coding

Keying and coding of transcripts was completed using a data entry application. Several quality control activities evaluated the various types of data collected (e.g. courses, major/field of study). This section will describe keying and coding procedures as well as outcomes.

4.2.1 Transcript Keying and Coding Procedures

Transcript keying and coding was performed by a team of specially trained, data entry (keyer/coder) staff using a web-based data entry application. Work was evaluated using several quality control activities designed for various types of data collected (e.g., courses, major/field of study). The keying and coding sections (figure 14) collected the following transcript information (for a full list of keyed and coded transcript data elements, see appendix I):

- *Case information.* Preliminary transcript information including student name, address, and high school graduation date.
- *Schools and terms.* Names of the transcript school and any transfer institutions reported on the transcript, terms attended at these schools, and attempted and accepted transfer credits.
- *Academics.* Academic honors awarded (e.g., Dean's or President's List) and any probations, by term.
- *Tests.* Institution exams (e.g., competency and placement exams) or externally administered exams (e.g., SAT and GRE), and related scores.
- *Degrees and majors.* Degree programs attempted or earned, such as a bachelor's or associate's degree, degree receipt dates, and honors awarded at graduation such as *cum laude*. The specific majors or fields of study for each degree were coded in this section.
- *Courses.* Key data on courses listed on transcripts, including the terms in which the courses were taken, course numbers and names, and grades and credit or clock hours earned. In this section, each course was also coded for standardization.

Figure 14. Keying and coding system sections: 2009

<i>Case information</i>	<i>Schools and terms</i>
Student name	School name, city, state
Address	Attendance dates by term
High school graduation date	Transfer credits attempted and accepted
<i>Academics</i>	<i>Tests</i>
Honors	Exam type
Probations	Date taken
<i>Degrees and majors</i>	<i>Courses</i>
Program (e.g., BA, AA)	Course number
Degree name	Course name
Date received	Course code
Graduation honors	Course credits
Major 1, 2; Minor 1, 2; Concentration	Grade

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

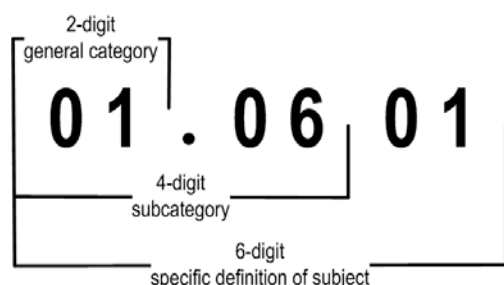
To help to ensure the quality of data keyed and coded, specific features were incorporated into the KCS. For example, the KCS provided links to institution course catalogs for easy reference; limited ranges and the types of characters input for fields such as dates and exam scores; and required that postsecondary institutions, majors, and courses be coded using specially designed coders.

KCS coding systems. The school and major or field of study coders incorporated into the KCS were assisted coders identical to those used in the BPS:04/09 student interview instrument. The school coder used the set of institutions contained in the Integrated Postsecondary Education Data System (IPEDS), developed by the National Center for Education Statistics (NCES) (<http://nces.ed.gov/IPEDS/>). The major or field of study coder was based on the 2010 Classification of Instructional Programs (CIP) taxonomy developed by NCES (<http://nces.ed.gov/ipeds/cipcode>). CIP codes not associated with postsecondary majors or fields of study were removed from the coder, including those for basic skills and developmental education, citizenship activities, health-related knowledge and skills, interpersonal and social skills, leisure and recreational activities, personal awareness and self-improvement, and high school/secondary diplomas and certificates.

The KCS course coder was similar to the KCS school and major or field of study coders, with the addition of certain search features. When a text string with the course title was entered, a keyword search based on the course title was conducted on the underlying database allowing the keyer/coder staff person to select the best option from a list of possible course options returned. If the course title did not adequately capture the description of the course in the institution catalog, keyer/coders could search the course coder database using keywords found in the course description in the institution course catalog, or they could do searches by broad categories and by database codes. The KCS also included a feature for entering problem sheets for particular schools or transcripts. Problem sheets were categorized and routed to supervising staff for resolution.

Development of the PETS course coder. The underlying database for the course coder in the KCS included 2,119 course codes and code definitions. Course codes were developed by integrating selected courses from the College Course Map (CCM) (Adelman, C. 2004) into the 2010 CIP taxonomy from NCES. PETS codes were represented by six digits in keeping with the CIP taxonomy: the first 2-digits indicated the most general category; the first 4-digits narrowed the focus to a subcategory; and the complete 6-digit code provided the most specific definition of the subject. Figure 15 provides a visual representation of the structure of the codes.

Figure 15. CIP code diagram: 2009



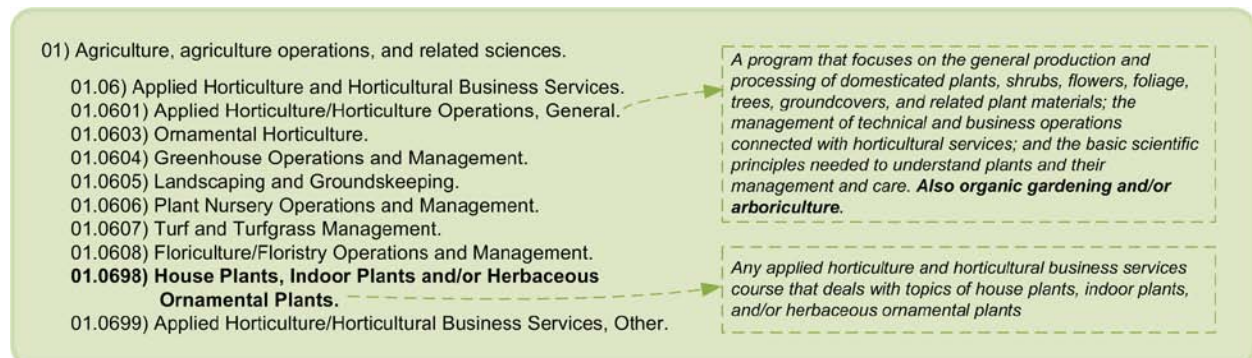
NOTE: CIP = Classification of Instructional Programs.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Course codes in the CCM taxonomy, which used the same 6-digit structure as the then-current CIP, were developed through extensive transcript analysis and with input from expert advisors, including postsecondary faculty familiar with the fields of study. To create a comprehensive course coder for PETS:09, content from the CCM was incorporated into the 2010 CIP in two ways: (1) course codes found in the CCM without equivalents in the CIP were added as new codes, and (2) CCM codes with equivalent CIP codes were reviewed and, when additional details or examples were found, they were added to the CIP definitions. The first method resulted in the addition of 352 unique CCM course codes to the KCS course coder. These additions were placed alongside related topics in the 2-digit category and 4-digit subcategory structure common to both the CCM and CIP taxonomies. To make these additions easily identifiable, the last 2 digits in their codes used a unique numbering scheme, starting with 98 and descending as needed. An example can be seen in code 01.0698 in figure 16.

The second method for integrating the CCM and the 2010 CIP resulted in adding content to the definitions of 316 CIP codes. The additional text increased the likelihood of identifying appropriate course codes using the keyword searchable KCS course coder. In instances where a CIP code was elaborated, the CCM content was placed at the end of the CIP definition. Finally, in addition to content from the CCM, 47 *general* and *other* codes were added to the KCS course coder using KCS course coder fifth and sixth digit values of “00” for *general* and “99” for *other*, when these codes were not already present in the CIP. Figure 16 illustrates a representative set of codes in the KCS course coder.

Figure 16. Course codes layout in the KCS coders: 2009



NOTE: Bold text represents content and codes added from the College Course Map taxonomy (CCM). KCS = keying and coding system.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Transcript courses were originally coded using the available draft of the 2010 CIP. The database for the course coder in the KCS was updated when the final version of the 2010 CIP was released in July 2009. Compared to the draft version, the final 2010 CIP included 80 new codes, 21 codes with different code numbers, and two codes that were deleted from the draft. For the 80 new codes in the final 2010 CIP, courses on transcripts previously coded with similar codes from the draft 2010 CIP were reviewed by keyer/coder staff to determine if they fit better into the new CIP codes. There were 17,778 courses previously coded with draft 2010 CIP codes that were updated to the final 2010 CIP codes. There were just three courses previously coded with deleted CIP codes from the draft 2010 CIP which, when reviewed, were assigned to similar, related codes in the final version of the 2010 CIP.

4.2.2 Training of Transcript Keyer/Coder Staff

Over the course of three separate 5-day trainings, beginning in January 2009, 71 keyer/coder staff were trained to use the KCS. Keyer/coders were supervised by five QCS who were responsible for administrative and management issues, as well as quality review of keyed and coded transcripts and keying and coding, as needed.

Each training session began with background on BPS, review of confidentiality regulations, fingerprinting, and signing of notarized affidavits. These activities were followed by an overview and discussion of the different types of transcript formats and key data elements to be located and entered into the KCS. Presentations on keying and coding fundamentals were followed by problem-solving exercises and practice sessions. The fifth day of training consisted primarily of supervised keying and coding practice using actual transcripts, followed by a practicum exam on which all trainees were required to obtain 90 percent or better proficiency for certification. The training agenda for transcript data collection is included in appendix G.

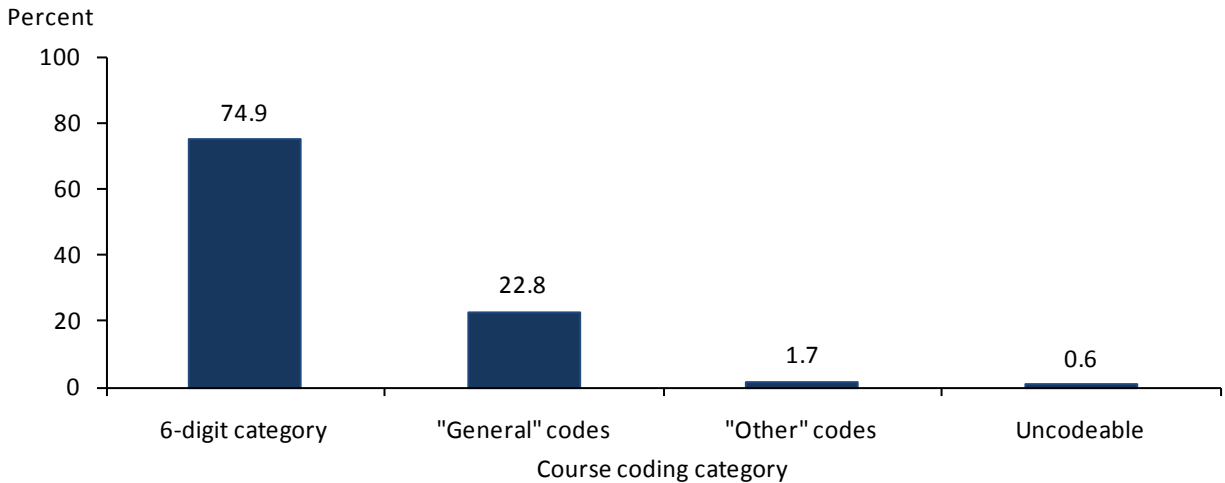
In conjunction with the above trainings and because of the wide variation in transcript layouts and information provided by the institutions, quality circle meetings were held weekly for the first 8 months of keying/coding. During the meetings, QCS and a group of keyer/coders were briefed on production and performance measures and were invited to ask questions or raise concerns. Topics discussed ranged from the use of specific CIP codes, to keying of the more problematic data elements. As the project progressed, the frequency of the quality circle meetings was adjusted to biweekly.

Often as a result of feedback during quality circle meetings, additional, narrowly focused trainings were held as needed for specific topics, such as entering multiple transcripts for sample members, coding of electronic transcripts, and the use of problem sheets to record issues or questions with transcripts.

4.2.3 Transcript Keying and Coding Outcomes

Keying and coding was performed on 25,120 transcripts for 16,960 students. These transcripts included a total of 583,380 courses, 36,680 terms, and 24,230 degrees. Of the 583,380 courses coded, 75 percent were coded with a specific 6-digit code that was neither a *general* nor an *other* code. *General* codes were selected for 23 percent of the courses coded and were typically chosen for the many introductory level courses, while *other* codes were selected for 2 percent of the courses when no more specific code matches in the KCS course coder were found for a course on a transcript. *Uncodeable* courses accounted for 1 percent of all courses, often due to unclear course titles or inadequate information on course content. The results of course coding are shown in figure 17.

Figure 17. Course coding results: 2009

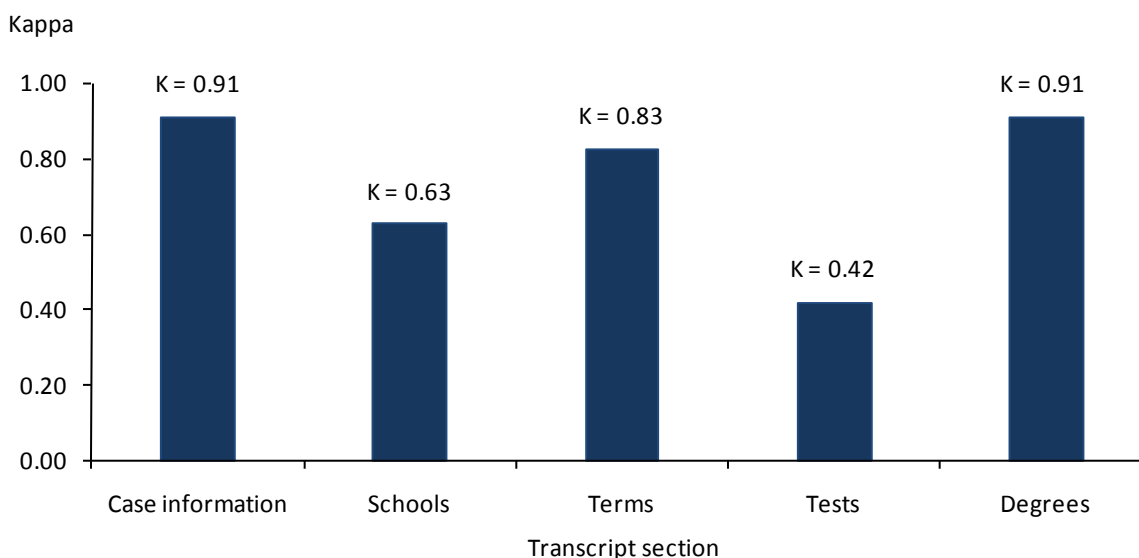


Source: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

4.2.4 Evaluation of Transcript Keying and Coding

Multiple evaluation steps were taken to ensure the quality of transcript data entered into the KCS. These evaluation activities included rekeying a sample of data elements, expert coding a sample of course and major/field of study coding, and upcoding of text strings for institutions or other transcript data elements that could not be coded initially.

Rekeying. To evaluate the reliability of transcript data keyed into the KCS, approximately 10 percent (2,670) of the transcripts were randomly selected to be rekeyed. A subset of transcript data elements were rekeyed by quality control supervisors, which took approximately 10 to 15 minutes per transcript, depending on the number of the selected data elements found on the transcript (e.g. the number of terms attended). Figure 18 shows agreement rates for the rekeying activity, organized by keying and coding section. For both rekeying and recoding activities, the Cohen's Kappa statistic was used to assess inter-rater reliability between the original coder and quality control supervisors, or expert coders. Cohen's Kappa measures the proportion of agreement between raters, above what would be expected by chance. A kappa score of 0.81-1.00 is considered "near perfect agreement," 0.61-0.80 is "substantial agreement," and 0.41-0.60 is "moderate agreement." All of the rekeyed items had at least moderate agreement, with case information, terms, and degrees all within the range of near perfect agreement.

Figure 18. Rekey kappa values, by transcript section: 2009

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Data collected in the test section of the KCS (exam name, date taken, and score), however, had a noticeably lower value for kappa (0.42) than other data elements. Further investigation into test data on transcripts revealed that of the 2,620 schools that provided transcripts, only 23 schools included Advanced Placement tests with scores on their transcripts. Instead, tests, particularly exams for which course credit is awarded, are often included on transcripts in a format more similar to courses (e.g. “AP biology, 3.0 credits”). Due to the low interrater reliability score and frequency with which test data was found on transcripts, this category of data was determined to be unreliable and will not be included in BPS data file because its presence on postsecondary transcripts was determined to be unreliable.

Expert coding. Expert coding was performed on 47,428 courses, both to evaluate the reliability of coded data and to create feedback opportunities to improve data quality. Expert coding used more experienced (expert) staff, all of whom held at least a bachelor’s degree, to recode a subsample of coded courses and to provide feedback to keyer/coders on course code selection. Expert coding was performed from the beginning of the keying and coding process and continued until its conclusion so that keyer/coder staff could receive feedback on their performance and additional training needs could be addressed properly.

Initially, the expert coding process included two steps. In expert coding 1 (EC1), expert coder staff reviewed course information and selected a code, which was then compared to the keyer/coder’s choice. In cases where the keyer/coder and expert coder selections did not match, expert coding 2 (EC2) was performed to assess the reliability of EC1. EC2, in addition to being performed on all cases where EC1 and keyer/coder choices did not match, was also performed on a 15 percent random sample of codes where the EC1 and keyer/coder agreed.

EC2 was performed as a review of the quality of the EC1 staff and included review of course information and deciding upon the EC1 choice, the keyer/coder choice, or an entirely different code—to avoid potential bias, the EC2 could not identify which selection was made by the EC1 or keyer/coder. EC2 review of keyer/coder EC1 disagreements added reliability to the EC1 code

selections upon which keyer/coder feedback was developed. EC2 was performed by the same project staff responsible for keyer/coder training and course code development.

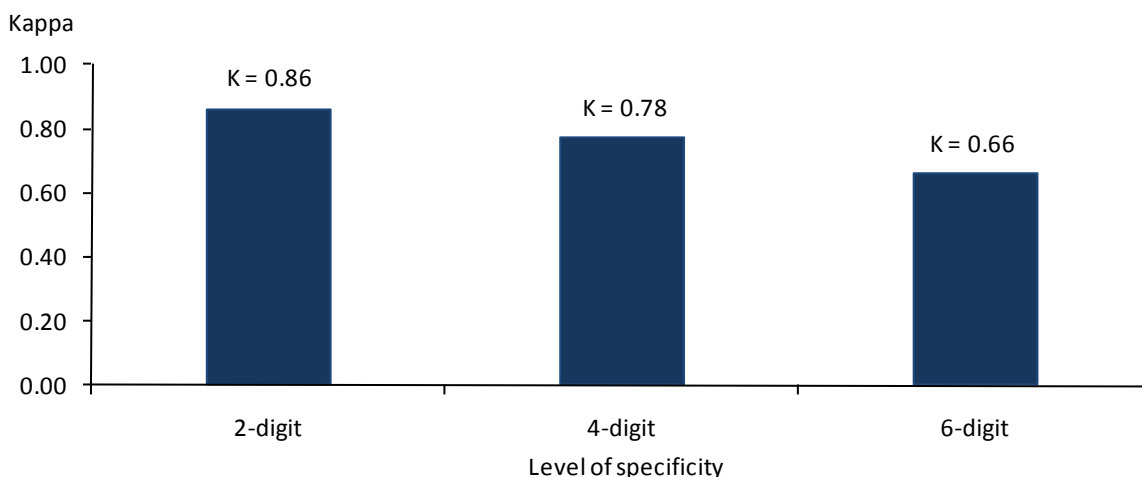
Based upon a sample of 1,330 disagreements between keyer/coder and EC1, EC2 agreed with EC1 in 58 percent of the cases, with the keyer/coder in 33 percent of the cases, and selected a different code (neither the EC1 nor the keyer/coder's choice) in 9 percent of the cases. The EC2 staff agreed with expert coder choices significantly more than the keyer/coder choices: $\chi^2(1, N = 1,330) = 90.04, p < 0.01$.

As with keying and coding, expert coding was performed in batches by school. Courses were not expert coded until all of a school's transcripts had been keyed and coded. For both EC1 and EC2, expert coders reviewed course number and name and had access to course catalogs to make coding decisions.

For the purpose of reviewing keyer/coder work and providing feedback, expert coding was performed on both random and cluster samples of courses. EC1 was performed on a random 10 percent sample of all courses from each school. For schools with fewer than 10 total courses, all courses were expert coded. Cluster sampling was used to select courses coded with *other* codes (e.g. 26.0299, biochemistry, biophysics and molecular biology, other). Courses coded as *needs review* or *uncodeable* were also reviewed in expert coding.

Interrater reliability for course coding was assessed using 5,000 courses randomly selected for calculating agreement statistics. Cohen's Kappa statistic was used to assess interrater reliability between the original coder and expert coders. Expert coding results are shown in figure 19. Agreement rates are shown at three levels of specificity: 2-digit, 4-digit, and 6-digit. At the 2-digit level, the kappa statistic indicates near-perfect agreement between keyer/coder and expert coder. At both the 4- and 6-digit levels, the kappa statistic indicates substantial agreement.

Figure 19. Expert coding results, kappa by level of specificity: 2009



SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

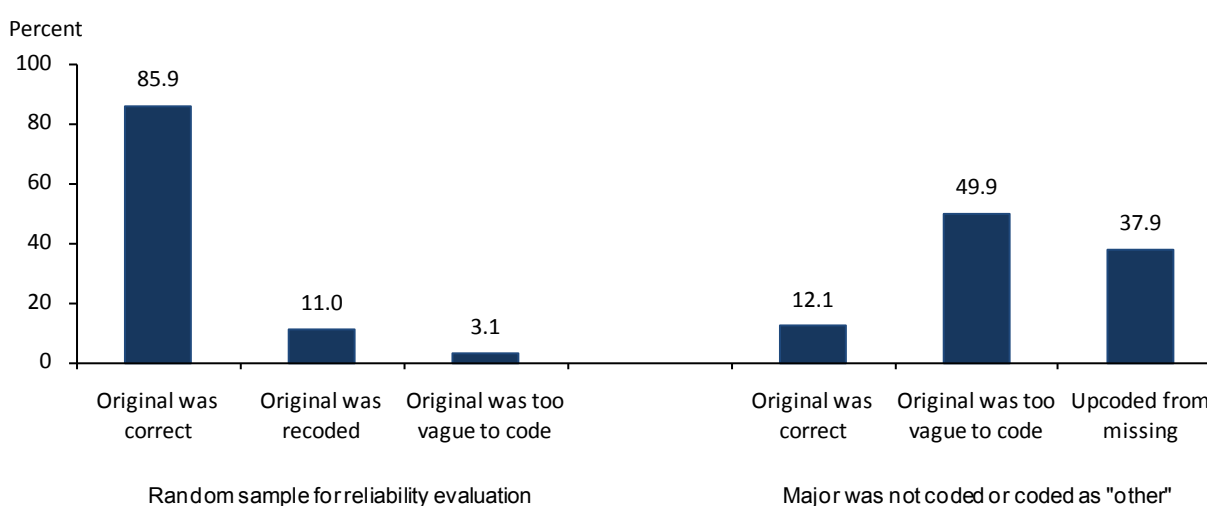
Review of “other” courses. For the first six months of keying, courses coded using the “other” category in the PETS:09 coder were reviewed by expert coders with the goal of minimizing the use of the category. Keyer/coder training emphasized that “other” codes should be reserved for courses that fit within a 4-digit subject area but for which more specific 6-digit codes in that series

were not appropriate. “Other” was not intended for coding problematic courses or those for which additional analysis would result in a more accurate code. Expert coders provided direct feedback to keyer/coders on cases for which there were more appropriate coding choices.

In addition to the expert coding performed, “other” codes were also reviewed to determine if additional codes should be added to the PETS coder. The PETS course taxonomy included 231 courses with an “other” designation, such as 31.0599, “Health and Physical Education/Fitness, Other,” or 23.9999, “English Language and Literature/Letters, Other.” A review of the courses coded as “other” was undertaken to determine if there were common subjects within the codes that would merit introduction of new codes. The median number of uses of “other” for all course codes was 132. This median was used as the threshold for adding a new code: if 132 instances of the same subject could be identified within the courses coded using the “other” code, a new code would be added. However, a review of “other” codes did not identify any subjects that met this threshold, so no new codes were added.

Upcoding and reliability recoding for major/field of study. In a process known as *upcoding*, text strings for 783 entries for field of study that were not coded by keyer/coders were later reviewed by project staff to determine if an appropriate code could be identified. For the uncoded majors, project staff was able to identify a major code in 38 percent of the cases. In 50 percent of the uncoded cases, data on the transcripts were too vague to identify an appropriate code and, in 12 percent of cases, the original code selection of “other” was correct. In addition to this upcoding activity, a random sample of 3,932 coded majors was *recoded* as needed as a key-rekey step to evaluate the reliability of the field of study data. For these cases, the coder and recoder agreed in 86 percent of the cases. The results are shown in figure 20.

Figure 20. Major/field of study upcoding: 2009



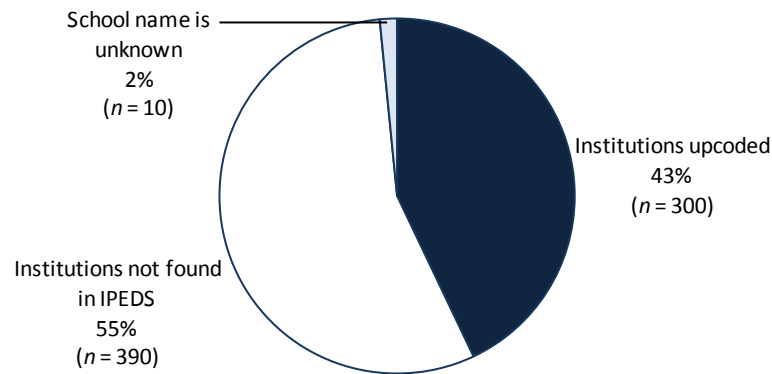
NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09)

Upcoding for institutions and variables with “other, specify” options. Uncoded text strings for institutions were *upcoded* through a review by project staff to determine if an appropriate code could be identified. This task was performed on 701 cases by staff with greater familiarity with postsecondary institutions and with additional resources for researching school names and locations. The results of this institution upcoding are shown in figure 21. In 55 percent of the cases, the

institution could not be identified in the Integrated Postsecondary Education Data System (IPEDS), and thus remained uncodeable. Analysts were able to code 43 percent of the previously uncodeable institutions while, for 2 percent of cases, the school name could not be identified at all.

Figure 21. Institution IPEDS upcoding: 2009



NOTE: Detail may not sum to totals because of rounding.

Source: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09)

In addition to institutions, transcript data elements with “other, specify” options included:

- non-course credits awarded (e.g. course credit for Advanced Placement tests),
- tests (e.g., SAT),
- academic honors (e.g., Dean’s List),
- academic probations (e.g., academic probation),
- degree programs (e.g., associate’s),
- grades (e.g., R),
- bachelor’s degree types (e.g., Bachelor of Education), and
- graduation honors (e.g., with distinction).

All items coded as “other, specify” were reviewed by analysts to determine if the text strings could fit into existing choices or if there were common strings that merited addition of a new choice. For example, Bachelors of Education was not included in a drop-down menu for bachelor type, therefore it was entered as a text string under “Other, specify.” When the value appeared repeatedly as a text string, it was assigned as a category and upcoded accordingly. Table 29 shows the results of “other, specify” upcoding. The total number of cases is shown for each data element along with the number and percent that were upcoded.

Table 29. Upcoding of "other, specify" data: 2009

Data elements with "other, specify" option	Number of "other, specify" cases	Number upcoded	Percent upcoded
Non-course credit awarded	3,370	2,520	74.6
Tests	3,840	1,590	41.5
Term honors	22,350	14,810	66.3
Term probations	7,250	6,670	92.0
Degree program	170	40	22.4
Grade	32,630	18,610	57.1
Bachelor's degree	430	310	71.8
Degree honors	270	170	61.9

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Keyer/coder staff debriefing. Near the conclusion of keying and coding, a debriefing focus group was held with 7 keyer/coders who had collectively keyed and coded more than 10,000 transcripts. Two participants had also performed duties as QCS. Focus group participants agreed that the keyer/coder training had been helpful and prepared them for the task. They also found quality circle notes and meetings to be useful. The keying and coding system facilitated entry of transcript data, although some data elements in the system were not commonly found on transcripts, such as “transfer credits for GPA” and “state basic skills tests.”

Regarding course coding, focus group participants found the search features of the KCS to be useful, but certain course subjects were difficult to code, such as engineering and computer courses, as well as some education courses, when it was difficult to discern whether the course was about learning the topic itself or learning about how to teach the topic. Finally, focus group participants indicated that identifying remedial courses was sometimes difficult, for instance when the course description sounded like it could be remedial but without stating so explicitly. In such cases, keyer/coders were sometimes able to confirm a course was remedial by noting a grade greater than an F with no credits awarded.

4.3 Timing of Transcript Keying and Coding

Transcript keying and coding was conducted from January 19, 2009, to June 11, 2010. On average each transcript took 51 minutes to key and code. The time to complete keying and coding varied by institution sector, ranging from a 39 minute average for transcripts from both public 2-year institutions and private, for-profit 2 years or more institutions, to 77 minutes for transcripts from private, nonprofit, 4-year doctorate granting institutions (table 30).

Table 30. Average minutes per transcript, by institution control and level: 2009

Institution control and level	Number of transcripts ¹	Average minutes/transcript
Total	8,050	51.38
Public		
Less than 2-year	190	39.74
2-year ²	2,940	38.77
4-year non-doctorate granting	700	53.52
4-year doctorate granting	1,200	63.96
Private nonprofit		
2-year or less	230	45.00
4-year non-doctorate granting	910	70.63
4-year doctorate granting	680	76.88
Private for-profit		
Less than 2-year	630	45.88
2 years or more ²	590	38.86

¹ Only transcripts completed in less than 4 hours were used in calculation of average minutes/transcript.

² Institution offered a 4-year degree during the sample member's enrollment.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

4.4 Transcript Data Collection Conclusions

A transcript collection was conducted for BPS:04/09 as part of PETS:09. Institution contactor staff were trained to facilitate the data collection process, using a transcript control system to aid institution representatives in the submission of transcripts. A PETS:09 website was also developed to aid institutions in the submission of transcripts, providing instructions for several secure electronic transmission methods, fax, and Federal Express.

Transcript keying and coding was performed using a specially designed keying and coding system that was divided into sections for the entry of data for case information, schools and terms, academics, tests, degrees and majors, and courses. A post-data collection debriefing of keyer/coder staff indicated the system was effective for transcript data entry. The PETS coder, created by merging 2010 CIP and 2003 CCM, provided a detailed code taxonomy for the coding of courses by subject.

The 5-day keyer/coder training and ongoing feedback offered through quality circle meetings prepared staff to reliably perform keying and coding tasks. All staff passed the proficiency test at the conclusion of training, and the results of the keying and course coding interrater reliability assessments indicate substantial agreement between keyer/coders and expert coders. Recoding of the random sample of major/field of study data further supported the reliability of the data.

Upcoding was performed on all uncoded institutions and additional data elements where “other, specify” options were available, such as non-course credit awarded, tests, honors, probations, and degree programs. Upcoding added greater detail to data collected. Courses coded with “other” codes were reviewed for common subjects, but none were found in great enough numbers to add new course codes.

Chapter 5.

Post-Data Collection Data File Processing Activities

The data files for the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) contain student-level data collected from administrative databases, student interviews, and transcripts. These data are available to users in two ways. A set of restricted research files fully documented through an electronic codebook (ECB) are available to restricted data licensees from the National Center for Education Statistics (NCES). Tables and regression analyses can be run by any user through NCES's online application PowerStats, which also contains variable documentation. This chapter describes each file and details the editing and documentation processes applied to each.

5.1 Administrative Record Matching

In addition to the student interview, data collection for BPS:04/09 included record matching to the Central Processing System (CPS), the National Student Loan Data System (NSLDS), and the National Student Clearinghouse (NSC) StudentTracker database. This section provides a discussion of the observed match rates for these three databases.

5.1.1 Central Processing System

The CPS contains data provided to the U.S. Department of Education by students and their families when they complete the Free Application for Federal Student Aid (FAFSA). Successful record matching to CPS can occur only for sample members who were federal student financial aid applicants for the years requested. Matching for BPS:04/09 was to CPS data for the 2007–08, 2008–09, and 2009–10 financial aid years, using a sample member's Social Security number (SSN) concatenated with the first two letters of the last name as the *CPS ID*. The percentage of sample members who matched to CPS for the 2007–08 academic year was about 28 percent. For 2008–09 and 2009–10, the rates were approximately 20 percent and 18 percent, respectively. As expected, match rates have declined through the years as fewer members of the BPS:04 cohort continue to be enrolled in postsecondary education and apply for federal aid. Table 31 provides the CPS matching results.

Table 31. Central Processing System matching results, by academic year: 2007–10

	Academic year					
	2007–08		2008–09		2009–10	
CPS matching results	Number	Percent	Number	Percent	Number	Percent
Total	18,640	100.0	18,640	100.0	18,640	100.0
Matched	5,120	27.5	3,700	19.9	3,270	17.5
Did not match	13,530	72.5	14,940	80.1	15,380	82.5

NOTE: Detail may not sum to totals because of rounding. CPS = Central Processing System.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003–04 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

5.1.2 National Student Loan Data System

The second major database for records matching in BPS:04/09 was the NSLDS. NSLDS matching was performed by the NSLDS contractor at the request of the U.S. Department of Education, using names, SSNs and dates of birth provided by RTI. Successful matching to NSLDS could occur only for sample members who had been awarded federal loans, Pell Grants, National Science and Mathematics Access to Retain Talent (SMART) Grants, or Academic Competitiveness Grants (ACGs). NSLDS files are historical, so information about a student's receipt of such loans and grants was available not only for the current academic year but also for any prior years. Consequently, match rates reported for the BPS:04/09 sample members do not necessarily reflect only the 2008–09 academic year. The federal loan match rate was about 60 percent, and the match rate for Pell Grants was about 48 percent. The number of sample members matching to the data system for ACGs or SMART Grants was less than 1 percent. This is not surprising, given that these grants are relatively new and are only available to undergraduate students. Table 32 summarizes the match rates observed for the BPS:04/09 sample members.

Table 32. National Student Load Data System matching results, by loan and grant type: 2009

NSLDS matching results	Federal loan		Pell Grant		ACG or SMART Grant	
	Number	Percent	Number	Percent	Number	Percent
Total	18,640	100.0	18,640	100.0	18,640	100.0
Matched	11,120	59.6	8,930	47.9	130	0.7
Did not match	7,520	40.4	9,720	52.1	18,510	99.3

NOTE: Detail may not sum to totals because of rounding. ACG = Academic Competitiveness Grant.

NSLDS = National Student Load Data System. SMART = Science and Mathematics Access to Retain Talent.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

5.1.3 National Student Clearinghouse

In addition to the CPS and NSLDS file matching, the BPS:04/09 sample was matched to the NSC StudentTracker database, which provides information on postsecondary enrollment, degree, and certificate records on behalf of participating postsecondary institutions. In order to perform the match, RTI supplied SSNs, names, and dates of birth for sample members to the NSC. Overall, a record match for a student's enrollment at any NSC-participating institution was obtained for about 58 percent of the BPS:04/09 sample. Match results in table 33 are based on enrollment and degree records from all participating institutions for the 2006–07 academic year through the 2008–09 academic year.

Table 33. National Student Clearinghouse StudentTracker matching results: 2009

NSC matching results	Number	Percent
Total	18,640	100.0
Matched	10,820	58.0
Did not match	7,830	42.0

NOTE: Detail may not sum to totals because of rounding. NSC = National Student Clearinghouse.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003–04 National Postsecondary Student Aid Study (NPSAS:04) and 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

5.2 BPS:04/09 Main Study Data Files

The primary analysis file, from which PowerStats was constructed, contains data for 16,680 study respondents. A BPS:04/09 study respondent was defined as any sample member who was determined to be eligible for the study, was still alive at the time of the BPS:04/09 data collection, and had the requisite valid data from any source to allow construction of his or her enrollment history.

The first data release was adjudicated and approved for public release in December, 2010. The primary analysis file contains over 1,500 variables, developed from multiple sources. Throughout the data collection period, data were processed and examined for quality control (QC) purposes. Editing of student data began shortly after the start of web data collection, when procedures and programs for this purpose were first developed. Anomalous values were investigated and resolved, where appropriate, through the use of data corrections and logical recodes. Interim files were delivered to NCES for review throughout the data collection period.

The restricted-use BPS:04/09 ECB contains the following files, each linked by the student's study ID¹⁷:

- *BPS:04/09 analysis file.* Contains analytic variables derived from all BPS data sources and selected direct student interview variables.
- *BPS:04/09 student data file.* Contains student interview data collected from 16,680 study respondents, which includes 15,160 interview respondents. Topics include enrollment history, enrollment characteristics, employment, and background.
- *BPS:04/09 institution analysis file.* Contains student-level analytic variables derived from the BPS:04/09 institution data file.
- *BPS:04/09 institution data file.* Contains institution and degree data obtained from the BPS:04/09 student interview for all study respondents. It is a student-level file; however, a student can have more than one record in the file. There is a separate record for each degree obtained from each postsecondary institution that the student attended between July 2006 and June 2009 (the maximum number of reported institutions for any one respondent was four).
- *BPS:04/09 coding data file.* Contains major or field of study, industry, and occupation strings collected in the BPS student interview and the associated codes.
- *CPS data files.* Contains data received from the CPS for the eligible sample members who matched to the financial aid application files.

2003–04: file contains about 13,780 sample members matched

2004–05: file contains about 10,680 sample members matched

2005–06: file contains about 8,130 sample members matched

2006–07: file contains about 7,160 sample members matched

2007–08: file contains about 5,120 sample members matched

¹⁷The restricted files are available to researchers who have applied for and received authorization from NCES to access the restricted ECB. Researchers may obtain authorization by contacting the NCES Data Security Office.

2008–09: file contains about 3,700 sample members matched

2009–10: file contains about 3,270 sample members matched

- *NSLDS loan data file.* Contains raw loan-level data received from the NSLDS for the 11,120 sample members who were awarded loans from 2003–04 through 2008–09. This is a history file with separate records for each transaction in the loan files; therefore, there can be multiple records per case spanning several academic years.
- *Pell Grant data file.* Contains raw grant-level data received from the NSLDS for the 8,930 sample members who were awarded Pell Grants from 2003–04 through 2008–09. This is a history file with separate records for each transaction in the Pell system; therefore, there can be multiple records per case.
- *ACG/SMART data file.* Contains raw grant-level data received from the NSLDS for the 130 sample members who were awarded ACGs or SMART Grants from 2003–04 through 2008–09. This is a history file with separate records for each transaction in the database; therefore, there can be multiple records per case.
- *ACT data file.* Contains data received from ACT for the 5,940 sample members who matched to the 1997–98 through 2002–03 ACT files.
- *2004 National Postsecondary Student Aid Study (NPSAS:04) file.* Contains the base-year data included in the NPSAS:04 ECB.
- *BPS:04/06 file.* Contains all first follow-up data included in the BPS:04/06 ECB.
- *BPS:04/09 weights file.* Contains all of the analysis weights created for BPS:04/09. There is a separate record for each study respondent.¹⁸

5.3 Transcript Data Files

The data files for the BPS:04/09 transcript component contain the data included on each transcript that was entered via the KCS, as well as almost 500 composite variables derived from that data. Many of the student-level derived variables are available through PowerStats.¹⁹ The following files were produced for the BPS:04/09 Transcript ECB, which contains the 17,000 transcript component respondents:

- *Transcript analysis file.* Contains over 350 student-level analytic variables derived from transcript data, and selected direct transcript variables.
- *Transcript data file.* Contains data, such as cumulative transcript totals and high school graduation date, from each transcript. Since there is a record for each transcript received, this file may contain multiple records per student.
- *Institution data file.* Contains institution-level data obtained from the student transcripts with a record for each institution that either was sampled and provided transcripts or was entered as a transfer institution noted on keyed transcripts. This is a file of

¹⁸ See Chapter 6 for a full description of the BPS:04/09 study weights.

¹⁹ A set of restricted research files fully documented through an electronic codebook (ECB) are available to restricted data licenses from the National Center for Education Statistics (NCES). Tables and regression analyses can be run by any user through NCES's online application Powerstats, which also contains variable documentation. Powerstats is available online via the DataLab site at <http://nces.ed.gov/datalab/index.aspx>.

institutions only; it does not contain a student ID or transcript ID. Each record includes institution control, level, location, credit/clock hour uses, calendar system, grading system, and units required to be designated full-time. This file also contains some institution-level derived variables such as institution selectivity and the percentage of faculty members who are full-time.

- *Student Schools data file.* Contains a record pertaining to a single pairing of student and school. That is, for every student there is a record for each school from which we have course data, whether from a transcript received from that school or from a transfer course listed on a transcript from another school, and therefore there may be multiple records per student. Each record contains student ID, school Integrated Postsecondary Education Data System (IPEDS) ID, date student first attended institution, transfer credits attempted/accepted at institution, and transfer credits for grade point average. This file also contains some student/school derived variables such as a 72 month enrollment string, attendance order, degree attainment indicators, and course cluster grade point averages and credits earned.
- *Degree data file.* Contains degree-level data with a record for each degree obtained or attempted, as listed on any transcript received. Each record includes degree and program data, such as type of degree, degree date, and degree honors received. Each record also includes majors, minors, concentrations, and their respective 2010 CIP codes. This file also contains some degree-level derived variables such as degree order and condensed field of study categories.
- *Courses data file.* Contains course-level data obtained from the student transcripts with a record for each course taken included on any transcript received, as well as transfer courses listed. Each record includes course name, course number, grade, credits earned, quality points, Postsecondary Education Transcript Study course code, and course attributes. This file also contains five course-level derived variables that normalize other variables. The normalization process allows for all values of the variable in question to be placed on the same scale so that they are comparable across students and institutions. This file contains a variable for normalized grade, potential credit, earned credit, and quality points.
- *Terms data file.* Contains a record pertaining to a single pairing of student and term for all institutions. Each record contains the IPEDS ID of the institution, transcript ID, term name, start and end dates, and honors/probation indicator. This file also contains some term-level derived variables such as total earned credits, term grade point average, and enrollment status.
- *Transfer data file.* Contains a record pertaining to a single transfer event possibility, defined as the possible movement of credit when students move from one school to another. Each record contains student ID, origin school IPEDS ID, destination school IPEDS ID, credit transfer ratio, and variables that describe the relationship between origin and destination institutions with respect to institution and degree program characteristics.
- *Weights file.* Contains the analysis weight and replicate weights created for the BPS transcript data. There is a separate record for each respondent.

5.4 Data Editing

The BPS:04/09 data, including data from the transcript component, were edited using procedures developed and implemented for previous studies sponsored by NCES, including the base-year study, NPSAS:04, and the first follow-up study, BPS:04/06. Following data collection, the information collected in the student instrument and in transcripts was subjected to various QC checks and examinations. For example, in the student interview these checks were conducted to confirm that the collected data reflected appropriate item routing (*skip patterns*). Another evaluation for both the student interview and transcripts involved examination of all variables with missing data and substitution of specific values to indicate the reason for the missing data. For example, an item may not have been applicable to particular students, or as in the interview, a respondent may not have known the answer to the question or might have skipped the item entirely (table 34).

Table 34. Description of missing data codes: 2009

Missing data code	Description
-1	Don't know
-3	Not applicable
-6	Value out of range
-8	Item was not reached due to an error
-9	Data missing ¹

¹ Missing data from the abbreviated interview were coded as -9.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Skip-pattern relationships in the interview database were examined by methodically cross-tabulating gate items and their associated nested items. In many instances, gate-nest relationships spanned multiple levels within the instrument. Items nested within a gate question may themselves have been gate items for additional items. Consequently, validating the gate-nest relationships often required several iterations and many multiway cross-tabulations to ensure the proper data were captured. Gate-nest relationships were also preserved and edited appropriately in the transcript data files; however, fewer of these relationships exist in that data.

The data cleaning and editing process for the BPS:04/09 data files involved a multistage process that consisted of the following:

1. Blank or missing data were replaced with -9 for all variables in the student interview and transcript databases. A one-way frequency distribution of every variable was reviewed to confirm that no missing or blank values remained. These same one-way frequencies revealed any out-of-range, or *outlier*, values which were replaced with a -6 value (e.g., hourly wages of \$0.10, rather than \$10.00). Creating SAS formats from expected values and the associated value labels also revealed any categorical outliers. Descriptive statistics were produced for all continuous variables. All values that were less than zero were temporarily recoded to *missing*, and the minimum, median, maximum, and mean values were examined to assess reasonableness of responses; anomalous data patterns were investigated and corrected, as necessary. For transcripts, missing data was also replaced with a -9 (e.g., if high school graduation date did not appear on the transcript) and one-way frequencies were reviewed for any *outlier* values and also given a -6 value (e.g., credit hours of 100 per course, rather than 3).
2. Legitimate skips were identified with use of instrument source code and flowcharts. Gate-nest relationships were defined to replace -9s (*data missing, reason unknown*) with -3s

- (*not applicable*), as appropriate. Two-way cross-tabulations between each gate-nest combination were evaluated; high numbers of nonreplaced -9 codes were investigated to ensure skip-pattern integrity. Nested values were further checked to reveal instances in which the legitimate skip code overwrote valid data, which typically occurred if a respondent answered a gate question and the appropriate nested items but then reverted to change the value of the gate to one that opened on an alternate path of nested items. Because responses to the first nested items remained in the database, they required editing. For transcripts, gate-nest relationships were limited; however, -3 values were set for inapplicable items. For example, if a transcript indicated that the student was still working on his or degree, then a -3 value was given to the *degree date* variable).
3. Variables were formatted (e.g., dates were formatted as YYYYMM), and time units were standardized for items that collected amounts of time in multiple units. In addition, any new codes assigned by expert coders reviewing IPEDS, industry, occupation, and major codes from the interview (including those strings that could not be coded during the interview) were merged back with the interview data files. At this stage, logical recodes were performed when the value of missing items could be determined from answers to previous questions or preloaded values. For example, if a student was not currently repaying education loans, then the monthly payment amount was recoded to \$0. For transcripts, missing IPEDS, major, and course codes were reviewed and finalized by expert coders.

Concurrently with data cleaning, documentation was developed for both instrument and transcript data to detail question text, response options, logical recoding, and the “applies to” text for each delivered variable (for documentation information, see the student instrument facsimile in appendix D).

5.5 Data Perturbation

To protect the confidentiality of information about specific individuals, BPS:04/09 interview data were subject to perturbation procedures to minimize disclosure risk. Perturbation procedures, which have been reviewed and approved by the NCES Disclosure Review Board, preserve the central tendency estimates but may result in slight increases in nonsampling errors.

In a study like BPS, there are multiple sources of data for some variables (CPS, NSLDS, student interview, etc.), and reporting differences can occur in each. Data swapping and other forms of perturbation, implemented to protect respondent confidentiality, can lead to inconsistencies as well.

5.6 Statistical Imputations

All variables from the student interview data and the derived variables in PowerStats with missing data were imputed. Imputed data are available in both PowerStats and the restricted derived data file. Derived variables obtained from student transcript data and the variables included in the remaining restricted files were not imputed. The variables were split into three groups, and a consistent imputation methodology was employed for each group. The sequence of variables imputed within the three groups depended on the rate and pattern of missing data for the variable requiring imputation. The general imputation methodology consisted of two steps. The first step, if applicable, was logical or deterministic imputation. If the imputed value could be deduced from the logical relationships with other variables, then that information was used to deterministically impute

the value for the recipient. The second step was weighted hot-deck imputation. A relatively homogenous group of observations was identified, and within this group a random donor's value was selected to impute a value for the recipient.

Prior to implementing the imputation process, all relationships among the variables were checked to ensure that the valid information adhered to the logical relationships. The imputation program was designed to impute all missing data as precisely and efficiently as possible using valid donor information, such that the process could be completed within a very short timeframe after the end of data collection and still maintain the desired quality. The aim was to replace missing data with data that were valid in all cases.

Variables requiring imputation were imputed sequentially. However, some variables that were related substantively or had similar levels of missing response were grouped together into blocks, and the variables within a block were imputed simultaneously. The order in which variables, or blocks of variables, were imputed was primarily based on the level of missing data. The variables with lower levels of missing data were imputed before the variables with higher levels of missing data. When a variable was selected for imputation based on its level of missing data, three specific pieces of information were evaluated. First, logical consistency was checked to make sure that any known relationships were maintained throughout the imputation process. Second, the pattern of missing data was evaluated to determine whether other variables should be included to create a block of variables requiring imputation. Finally, the imputation class variables and sorting variables were identified.

All stochastic imputations used a tree methodology to create imputation classes and the weighted sequential hot-deck (WSHD) methodology (Cox 1980; Iannacchione 1982) within imputation classes. The imputation classes were formed using nonparametric classification trees (Breiman et al. 1984). The nonparametric classification trees formed imputation classes for a prediction model based on the observations with valid values for the variable requiring imputation. The nonparametric classification tree recursively split the cases into homogenous groups, which were used to define the imputation classes. The observations with missing values were assigned their imputation class based on the same variables used in the tree splits.

The WSHD methodology replaced missing data with valid data from a donor record within an imputation class. The WSHD methodology also incorporated sorting within imputation classes for additional control and used the sample weight of each record in the donor selection process. The imputation classes in the application of the WSHD methodology were formed by identifying variables related to the variable requiring imputation. Data were sorted within each imputation class to increase the chance of obtaining a close match between donor and recipient. Within each imputation class, the hot-deck process searched for donors sequentially, starting with the recipient and progressing up and down the sorted file to find the set of eligible donors from which a random selection of a donor was made. The process was weighted since it incorporated the sample weight of each record in the search and selection routine, using the methodology described in Cox (1980).

Imputation diagnostics consisted of four checks: number of times a donor was used, overall imputation checks, imputation checks by class variables, and multivariate consistency checks. The check for the number of times a donor was used was to ensure that donors were used a reasonable number of times. Using a donor too many times could have indicated that an imputation class had too few donors, and that the class needed to be enlarged. The overall imputation checks compared the distributions, weighted and unweighted, for each level of the imputed variable before and after imputation. Differences greater than 5 percent were flagged and examined to see if changes should

be made to the imputation specification. The imputation checks by class variables compared the distributions, weighted and unweighted, for each level of the imputed variable in the defined imputation classes before and after the imputation. Differences greater than 5 percent were flagged for further review. Finally, multivariate consistency checks ensured that relationships between variables were maintained and that any special instructions for the imputation were implemented properly.

If any of the four aforementioned diagnostic checks indicated a donor was used too many times, substantial deviation from the weighted sums, or any identified inconsistencies, the imputation process was revised and rerun. Some results of the imputation process are provided in appendix J, which presents the item response and nonresponse rates for each variable subject to imputation. Appendix J also contains the means of the continuous variable before and after the imputation (the mean of the variables for the cases who responded to the items, and the mean of the variables for all cases with either nonmissing or imputed data) and percent distributions of the categorical variables before and after imputation. Approximately 17 percent of the variables showed statistically significant differences between the pre- and post- imputation means and distributions.

5.7 Composite and Derived Variable Construction

Analysts created the main study analytic variables by examining the data available for each student from the various data sources, prioritizing the data sources on an item-by-item basis, and reconciling discrepancies within and between sources. In some cases, the derived or composite variables were created by simple assignment of a value from the available source with the highest priority. In other cases, interview items were recoded or otherwise summarized to create a derived variable. Similar procedures were used for transcript analytic variables using only data from transcripts and institutions providing transcripts. Details about the creation of each variable appear in the variable descriptions contained in the ECB and PowerStats. For a listing of the set of analysis variables derived for BPS:04/09, see appendix K.

Chapter 6.

Weighting and Variance Estimation

This chapter provides information pertaining to the weighting procedures for the 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09). The development of statistical analysis weights for the BPS:04/09 sample, which were derived from the BPS:04/06 weights, is discussed in section 6.1. Analysis procedures that can be used to produce design-unbiased estimates of sampling variances are discussed in section 6.2, including variances computed using Taylor series and bootstrap replication techniques. Section 6.2 also describes how the Taylor series strata and primary sampling unit (PSU) variables and the bootstrap replicate weights were constructed. Section 6.3 gives weighted and unweighted response rates. Section 6.4 discusses the accuracy of BPS:04/09 estimates for precision and the potential for nonresponse bias.

6.1 Analysis Weights

The weights for analyzing the BPS:04/09 data were derived from the BPS:04/06 weights because the BPS:04/09 respondents are a subset of the BPS:04/06 sample. The BPS:04/06 weights were derived from the 2003–04 National Postsecondary Student Aid Study (NPSAS:04) weights because the BPS:04/06 sample members are a subset of the NPSAS:04 sample. As described in chapter 2, all of the BPS:04/06 sample members (with the exception of those who were deceased) were included in the BPS:04/09 data collection. Three weights were developed for analyzing the data from the BPS:04/09 data collection. One weight was developed for analyzing sample members who were considered study respondents for BPS:04/09. A second, longitudinal or panel weight, was developed for analyzing records of sample members who were considered study respondents for the base-year study (NPSAS:04), the first follow-up (BPS:04/06), and the second follow-up (BPS:04/09). A third weight was developed for analyzing cases with transcript data. The weights were adjusted for nonresponse and were also raked to IPEDS and NPSAS:04 control totals. This section describes the steps that were followed in order to develop each weight.²⁰

6.1.1 Analysis Weights for BPS:04/09 Study Respondents

A BPS:04/09 study respondent was defined as any sample member who was determined to be eligible for the study, was still alive at the time of the BPS:04/09 data collection, and had the requisite valid data from any source to allow construction of his or her enrollment history. In addition to the BPS:04/09 student interview, student-level data for BPS:04/09 were collected from a variety of administrative sources, including the National Student Loan Data System and the National Student Clearinghouse Tracker file, as described in section 2.5. Data from these other sources supplemented interview data and allowed enrollment histories and persistence and attainment variables to be constructed for a proportion of interview nonrespondents. Of the 18,640 students who were BPS-eligible at the conclusion of BPS:04/06, after BPS:04/09 data collection there were 110 who were found to be deceased, 15,160 who were interview respondents, 1,520 who were not interview respondents but who had enough data from other sources to be classified as

²⁰ Three analysis weights were also constructed for BPS:96/01: A weight for the analysis of data from BPS:96/01, a weight for the analysis of data from NPSAS:96 and BPS:04/06, and a weight for analyses that include data from NPSAS:96, BPS:96/98, and BPS:96/01. However, BPS:96/01 did not have a transcript component, and therefore no transcript weight. BPS:96/01 also did not use the study respondent definition and did not impute for missing item data; as a result three weights were needed for the analysis of interview data compared with the two weights needed for analysis of interview data in BPS:04/09.

BPS:04/09 study respondents, and 1,860 who did not have enough data to be considered study respondents. Therefore, there were a total of 16,680 study respondents.

The initial weight for the BPS:04/09 cohort was the BPS:04/06 analysis weight. An adjustment was made for study nonresponse using a model-based constrained logistic weighting procedure. The weights were then calibrated to weight sums from BPS:04/06, which had been calibrated to IPEDS and NPSAS:04 control totals as described earlier.²¹ The procedure WTADJUST in SUDAAN (RTI, 2008) was used to implement the nonresponse and calibration adjustments. This weighting methodology is described by Folsom and Singh (2000).

The first adjustment was for study nonresponse. The adjustment model included the 18,540 cases who were not deceased; the response indicator was set to 1 for the 16,680 study respondents and to 0 for the 1,860 cases who were not deceased but were study nonrespondents. Independent variables were chosen that were considered to be predictive of response status, and were nonmissing for both study respondents and nonrespondents. Variables used in the nonresponse adjustment models for BPS and NPSAS surveys were also included. Candidate predictor variables included:

- Institution type,
- Whether in one of the 12 states with state-representative samples of undergraduates in NPSAS:04,
- OBE (Office of Business Economics) region,
- Institution enrollment during 2003–04 from the IPEDs file,
- Age as of December 31, 2003,
- Gender,
- Race/ethnicity
- Citizenship status during the base year,
- Number of institutions attended,
- Enrollment pattern during the base year,
- Whether any dependent children during the base year,
- Income and dependency status during the base year,
- Degree plans during the base year,
- Whether degree was attained through 2006,
- Persistence and attainment in 2006,
- Retention and attainment at base year institution through 2006,
- Parents' highest education level,

²¹ The base weight and the adjustment factors from BPS:04/06 and BPS:04/09 are not included on the BPS data file, but can be requested on a separate data set from NCES.

- Applied for any aid during the base year,
- Type of aid package during the base year,
- Pell Grant recipient,
- Amount of Pell Grant,
- Stafford Loan recipient,
- Amount of Stafford Loan,
- Federal aid recipient,
- Institutional aid recipient,
- State aid recipient,
- Amount of PLUS (Parents' Loan for Undergraduate Students) Loan,
- CPS data available during base year,
- In field cluster for BPS:04/09,
- NPSAS:04 interview respondent, and
- BPS:04/06 interview respondent.

Variables included in the nonresponse modeling included all of the candidate predictor variables as well as certain important interaction terms. To detect important interactions for the nonresponse model, a Chi-squared automatic interaction detection analysis (CHAID) was performed on the predictor variables. The CHAID analysis divided the data into segments that differed with respect to the response variable. The segmentation process first divided the sample into groups based on categories of the most significant predictor of response. It then split each of these groups into smaller subgroups based on other predictor variables. It also merged categories of a variable that were found to be nonsignificant. CHAID was run for up to three segments, resulting in the identification of two-way and three-way interactions. Variables that made up the CHAID interaction terms were whether the student was a BPS:04/06 interview respondent, persistence and attainment in 2006, retention and attainment through 2006, whether in a field cluster during the BPS:04/09 data collection, and the state in which the NPSAS:04 institution is located.

Table 35 lists the predictor variables used in the model to adjust the weight for nonresponse and the average weight adjustment factors resulting from these variables. The nonresponse weight adjustment factors have the following characteristics:

- Minimum: 1.00;
- Median: 1.02; and
- Maximum: 2.95.

Table 35. Weight adjustment factors for nonresponse for the BPS:04/09 study weights: 2009

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Total	16,680	89.18	1.11
Type of institution			
Public			
Less-than-2-year	430	78.98	1.26
2-year	5,570	87.69	1.13
4-year non-doctorate-granting	1,590	93.43	1.06
4-year doctorate-granting	2,990	96.74	1.03
Private nonprofit			
Less than 4-year	440	85.54	1.16
4-year	3,690	95.50	1.04
Private for-profit	1,980	76.27	1.33
NPSAS institution control 2003–04			
Public	10,580	90.45	1.10
Private nonprofit	4,130	94.76	1.05
Private for-profit	1,980	76.27	1.33
NPSAS institution level 2003–04			
Less-than-2-year	1,570	75.23	1.35
2-year	6,470	86.68	1.15
4-year	8,640	94.36	1.05
In 12 state NPSAS:04 representative sample			
Yes	8,340	89.07	1.11
No	8,350	89.26	1.12
Bureau of Economic Analysis code (Office of Business Economics [OBE]) region			
New England (CT ME MA NH RI VT)	1,110	89.67	1.11
Mid East (DE DC MD NJ NY PA)	2,480	88.15	1.13
Great Lakes (IL IN MI OH WI)	2,860	89.45	1.11
Plains (IA KS MN MO NE ND SD)	1,770	92.09	1.07
SE (AL AR FL GA KY LA MS NC SC TN VA WV)	3,810	88.66	1.12
Southwest (AZ NM OK TX)	1,760	87.62	1.13
Rocky Mountains (CO ID MT UT WY)	590	91.11	1.11
Far West (AK CA HI NV OR WA)	2,080	89.53	1.12
Other jurisdictions (PR)	250	92.18	1.08
NPSAS:04 institution enrollment size			
1,821 or fewer	3,860	82.82	1.21
1,822–6,690	4,210	89.22	1.09
6,691–16,522	4,250	90.17	1.09
16,523 or more	4,360	92.46	1.07
Age as of 12/31/03			
15 to 18	7,920	93.63	1.06
19	4,320	91.97	1.08
20 to 23	1,780	83.26	1.21
24 to 29	1,060	78.09	1.30
30 or older	1,620	81.61	1.25

See notes at end of table.

**Table 35. Weight adjustment factors for nonresponse for the BPS:04/09 study weights: 2009—
Continued**

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Gender			
Male	6,880	87.97	1.13
Female	9,810	90.08	1.10
Race/ethnicity			
White	10,740	90.78	1.09
Black or African American	2,200	86.77	1.15
Hispanic or Latino	2,110	85.33	1.17
Asian	770	90.68	1.11
American Indian or Alaska Native/Native Hawaiian or other Pacific Islander/Other/More than one race	860	86.36	1.16
Citizenship status 2003–04			
US citizen	15,810	89.51	1.11
Resident alien	700	86.07	1.18
Foreign or international student	170	75.72	1.31
Number of institutions attended 2003–04 (NPSAS)			
1	15,500	89.35	1.11
2	1,140	85.93	1.12
3	40	95.96	1.03
Enrollment pattern 2003–04 (NPSAS)			
Enrolled mostly full-time	13,920	90.21	1.10
Enrolled mostly part-time	2,380	85.82	1.17
Enrolled full-time & part-time equally	390	89.85	1.11
Any dependent children, 2003–04			
Yes	2,350	79.82	1.26
No	14,340	91.19	1.09
Number of family members in college for independent student, or dependent student in 2003–04			
1	3,460	81.20	1.25
2	300	79.46	1.28
3 or 4	50	94.69	1.06
Dependent student	12,880	92.36	1.07
Total income by dependency 2003–04			
Dependent students			
Less than \$10,000	700	85.92	1.16
\$10,000–\$19,999	1,040	88.67	1.12
\$20,000–\$29,999	1,320	91.37	1.08
\$30,000–\$39,999	1,290	91.16	1.09
\$40,000–\$49,999	1,150	91.04	1.09
\$50,000–\$59,999	1,070	90.61	1.10
\$60,000–\$69,999	1,210	94.34	1.05
\$70,000–\$79,999	920	95.11	1.04
\$80,000–\$99,999	1,560	95.58	1.04
\$100,000 or more	2,630	94.66	1.04

See notes at end of table.

Table 35. Weight adjustment factors for nonresponse for the BPS:04/09 study weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Independent students			
Less than \$10,000	700	81.40	1.23
\$10,000–\$19,999	1,370	79.08	1.26
\$20,000–\$29,999	640	79.89	1.28
\$30,000–\$49,999	600	83.40	1.21
\$50,000 or more	490	84.34	1.22
Degree plans first year 2003–04			
Certificate	2,250	77.58	1.30
Associate's degree	5,160	86.49	1.14
Bachelor's degree	8,020	95.12	1.04
No degree	1,250	89.65	1.11
Degree types attained through 2006			
Certificate only, associate only, certificate and associate, or bachelor only	2,860	89.14	1.13
Never attained or (Associate and bachelor)	13,830	89.19	1.11
Highest degree attained anywhere, 2006			
Certificate	1,380	82.66	1.23
Associate's degree	1,250	94.45	1.05
Bachelor's degree or never attained	14,060	89.32	1.11
Persistence and attainment anywhere, 2006			
Attained (still enrolled and not enrolled)	2,860	89.15	1.13
No degree, still enrolled	9,380	96.37	1.03
No degree, not enrolled	4,450	78.08	1.27
Retention and attainment at first institution, 3-year total 2006			
Associate's or bachelor's degree	1,300	94.91	1.05
Certificate	1,270	82.22	1.24
No degree, still enrolled	7,720	95.40	1.04
No degree, transferred	3,170	92.36	1.08
No degree, left without return	3,230	76.56	1.30
Parent's highest education level, 2003-04			
Did not complete high school	1,080	86.24	1.17
High school diploma or equivalent	4,220	84.65	1.18
Vocational or technical training	660	91.36	1.08
Less than two years of college	1,300	90.74	1.09
Associate's degree	1,230	88.07	1.13
2 or more years of college but no degree	870	88.47	1.12
Bachelor's degree	3,580	93.13	1.07
Master's degree or equivalent	2,310	93.41	1.06
First-professional degree	430	96.61	1.03
Doctoral degree or equivalent	640	93.32	1.05
Do not know parent's education level	370	80.27	1.27

See notes at end of table.

**Table 35. Weight adjustment factors for nonresponse for the BPS:04/09 study weights: 2009—
Continued**

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Applied for any aid, 2003–04			
Yes	14,720	88.98	1.11
No	1,970	90.25	1.10
Aid package by type of aid, 2003–04			
Grants only	4,720	90.18	1.10
Loans only	940	89.39	1.16
Work-study only	100	93.99	1.05
Other only	200	88.63	1.13
Grants and loans	3,430	85.03	1.16
Grants and work-study	520	94.90	1.04
Grants and other	250	88.03	1.13
Loans and work-study	80	93.80	1.08
Loans and other	330	94.60	1.09
Grants, loans, and work-study	1,200	94.96	1.05
Grants, loans, and other	780	88.25	1.11
Grants, work-study, and other	30	87.47	1.17
(Grants, loans, work-study, and other) or (Work-study and other) or (Loans, work-study, and other)	360	96.81	1.03
No aid received	3,770	88.95	1.12
Pell Grant recipient			
Yes	6,060	85.45	1.15
No	10,630	91.25	1.09
Pell Grant amount received (in dollars)			
None	10,630	91.25	1.09
\$2,000 or less	2,000	85.51	1.17
\$2,001 to \$3,700	2,080	84.04	1.16
\$3,701 or more	1,980	87.10	1.13
Stafford Loan recipient			
Yes	6,690	88.05	1.13
No	9,990	89.78	1.10
Stafford Loan amount received (in dollars)			
None	9,990	89.78	1.10
\$2,624 or less	1,130	87.78	1.13
\$2,625	3,590	94.32	1.05
More than \$2,625	1,980	79.60	1.26
Federal aid recipient			
Yes	10,140	88.29	1.12
No	6,540	90.26	1.10
Federal aid amount received (in dollars)			
None	6,540	90.26	1.10
\$2,831 or less	3,380	89.20	1.11
\$2,832 to \$6,625	3,490	89.33	1.12
More than \$6,625	3,270	86.19	1.14

See notes at end of table.

Table 35. Weight adjustment factors for nonresponse for the BPS:04/09 study weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Institutional aid recipient			
Yes	5,280	94.07	1.05
No	11,410	87.52	1.14
State aid recipient			
Yes	4,030	92.09	1.08
No	12,650	88.42	1.12
PLUS amount received (in dollars)			
None	15,250	88.96	1.12
\$5,825 or less	470	90.28	1.09
\$5,826 to \$10,207	490	91.65	1.07
More than \$10,207	480	94.74	1.05
Data available from Central Processing System (CPS) 2003–04			
Yes	12,290	89.09	1.11
No	4,390	89.38	1.11
In field cluster in 2009			
Yes	940	63.74	1.54
No	15,740	91.48	1.09
NPSAS:04 interview respondent			
Yes	16,400	90.10	1.11
No	290	73.53	1.35
BPS:04/06 interview respondent			
Yes	13,910	93.82	1.06
No	2,770	73.19	1.35
Chi-square automatic interaction detection (CHAID) segments			
BPS:04/06 interview nonrespondent			
No degree, still enrolled in 2006			
Base year institution located in AZ, FL, DE, PA, IN, or WV	190	73.03	1.35
Base year institution located in CO, HI, UT, NE, NV, SC, WA, NH, DC, ID, MO, WI, ME, MT, SD, NC, ND, VT, WY, or PR	220	98.53	1.01
Base year institution located in IA, AK, CT, OH, NJ, IL, GA, OR, LA, MN, NM, or RI	350	90.99	1.08
Base year institution located in other states	590	83.81	1.19
No degree, not enrolled anywhere in 2006			
Base year institution located in AL, IA, TX, NH, DE, OK, IN, KY, or NC	260	71.96	1.37
Base year institution located in AK, NY, NU, MA, DC, ID, KS, NE, RI, SC, or WV	180	48.27	2.04
Base year institution located in CO, CT, HI, OR, ME, SD, ND, WA, or WY	130	87.77	1.16
Base year institution located in other states	630	61.28	1.60

See notes at end of table.

Table 35. Weight adjustment factors for nonresponse for the BPS:04/09 study weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Attained degree (either still enrolled or not enrolled in 2006)			
Base year institution located in AK, AR, NH, DC, MD, HI, ID, NE, MN, MT, SD, NV, NM, ND, RI, WY, AZ, NJ, TN, or VT	70	95.45	1.02
Base year institution located in TX, CA, IL, OK, or MI	90	77.31	1.28
Base year institution located in other states	80	53.69	1.94
BPS:04/06 interview respondent			
Attained bachelor's degree at the first institution or no degree and still enrolled at the first institution anytime in 2005-06			
Base year institution located in AK, AR, NH, DC, MD, HI, ID, NE, MN, MT, SD, NV, NM, ND, RI, WI, AZ, NJ, TN, or VT	1,250	98.20	1.02
Base year institution located in CO, FL, OK, UT, SC, WA, or WV	700	97.08	1.03
Base year institution located in DE, PA, OR, KS, KY, ME, MI, MS, NC, or PR	1,430	99.57	1.00
Base year institution located in other states	3,460	98.36	1.01
Attained certificate at first institution or no degree, no transfer, and not enrolled at first institution anytime in 2005-06			
Not in BPS:04/09 field cluster	3,250	86.81	1.16
In BPS:04/09 field cluster	230	64.35	1.58
No degree, transferred from the first institution by June 2006			
Base year institution located in AK, VA, AR, NH, DC, ID, OR, WI, NE, ME, MT, SD, NV, NM, RI, VT, WY, CO, CT, NJ, PA, IL, MD, HI, MS, ND, WV, or PR	740	93.87	1.06
Base year institution located in IA, FL, OK, TN, LA, MN, NC, OH, SC, WA	620	98.93	1.01
Base year institution located in other states	1,180	96.15	1.04
Attained associate's degree at first institution			
Base year institution located in AZ, TX, MA, WI, IN, MS, CO, OH, NH, HI, ID, KS, KY, LA, MI, MT, SD, NM, NC, ND, RI, SC or WA	350	98.91	1.01
Base year institution located in VA, CT, NY, NJ, PA, TN, MN, or PR	300	94.83	1.05
Base year institution located in other states	400	89.97	1.10

NOTE: Detail may not sum to totals because of rounding. Categories of undergraduate enrollment were determined by quartiles. Categories of Pell grant amount and Stafford loan amount were determined by tertiles.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

To ensure population coverage and consistency with NPSAS:04 and BPS:04/06, the BPS:04/09 study weights were further adjusted to control totals. This adjustment was implemented using the SUDAAN WTADJUST procedure. Variables used to define the control totals were the same as those used for the calibration-coverage adjustments for NPSAS:04 and BPS:04/06. The control totals for the BPS:04/09 weights were obtained using the weighted sums from BPS:04/06 (using the BPS:04/06 analysis weights) for these same variables.

The following variables were used in defining control totals for the NPSAS:04 study weights. NPSAS weight sums were used in defining control totals for BPS:04/06, and control totals for BPS:04/09 were established by summing the BPS:04/06 weights for the full cohort (including deceased students).

- Total fall undergraduate enrollment,

- Fall undergraduate enrollment by institution type,
- Non-fall undergraduate enrollment by institution type,
- Amount of Pell Grants by institution type, and
- Amount of Stafford Loans by institution type.

The following variables, derived from the IPEDS 2003 file were also control totals for BPS:04/06 and the corresponding values were again used for BPS:04/09:

- Number of fall freshmen by institution type,
- Number of fall full-time freshmen by institution type,
- Number of fall full-time freshmen receiving federal loans by institution type,
- Amount of federal loans for fall full-time freshmen, by institution type,
- Number of fall full-time freshmen receiving federal grants by institution type, and
- Amount of federal grants for fall full-time freshmen by institution type.

The control totals include cases who became ineligible for BPS:04/09 due to death. Because of this, the 110 deceased cases in BPS:04/09 were also included in the calibration adjustment. After the adjustment, the deceased cases were dropped from the file; the sum of the final weights estimates the number of NPSAS:04 students who were eligible for BPS and were still alive at the time of the BPS:04/09 interview. Table 36 shows the variables used for the calibration, the values of the control totals, and the average weight adjustment factors for each variable. The last column of table 36 shows the sum of the study weights after removing the cases who were deceased at the time of the BPS:04/09 data collection. Statistics for the weight adjustment factors are the following:

- Minimum: 0.79,
- Median: 1.00, and
- Maximum: 1.37.

The response adjusted, calibrated study weight is the variable WTA000 on the data file.

Table 36. Control totals, weight adjustment factors, and sum of weights for eligible cases for the BPS:04/09 study weight raking adjustment: 2009

Model predictor variables	Control total	Study weights – average weight adjustment factor	Sum of final weights for eligible cases
Total	3,766,832	1.00	3,746,295
Total fall undergraduate enrollment	3,216,468	1.00	3,199,574
Fall enrollment, by institution type			
Public			
Less-than-2-year	43,862	1.02	43,700
2-year	1,246,603	1.00	1,242,966
4-year non-doctorate-granting	336,116	1.00	333,965
4-year doctorate-granting	625,619	1.00	623,377
Private nonprofit			
Less than 4-year	34,663	1.01	34,623
4-year non-doctorate-granting	298,980	1.02	298,554
4-year doctorate-granting	199,524	0.99	198,107
Private for-profit			
Less-than-2-year	204,002	0.98	200,697
2 years or more	227,099	1.02	223,583
Non-fall enrollment, by institution type			
Public			
Less-than-2-year	43,732	1.01	43,378
2-year	1,513,468	1.00	1,505,878
4-year non-doctorate-granting	347,399	0.99	344,941
4-year doctorate-granting	617,794	1.00	614,269
Private nonprofit			
Less than 4-year	36,724	1.01	36,717
4-year non-doctorate-granting	319,416	1.01	319,078
4-year doctorate-granting	195,483	0.99	194,066
Private for-profit			
Less-than-2-year	209,655	0.99	208,671
2 years or more	266,008	1.02	263,162
Amount of Pell Grants awarded, by institution type (in dollars)			
Public			
Less-than-2-year	\$ 53,948,057	1.00	\$ 53,793,325
2-year	990,010,671	0.99	987,176,888
4-year non-doctorate-granting	326,046,179	1.01	326,046,179
4-year doctorate-granting	423,246,907	1.01	420,302,200
Private nonprofit			
Less than 4-year	82,734,652	1.01	82,072,863
4-year non-doctorate-granting	273,963,345	1.05	273,647,143
4-year doctorate-granting	116,529,949	1.01	115,766,595
Private for-profit			
Less-than-2-year	596,775,900	1.01	598,631,871
2 years or more	496,981,810	0.97	492,562,087

See notes at end of table.

Table 36. Control totals, weight adjustment factors, and sum of weights for eligible cases for the BPS:04/09 study weight raking adjustment: 2009—Continued

Model predictor variables	Control total	Study weights – average weight adjustment factor	Sum of final weights for eligible cases
Amount of Stafford Loans awarded, by institution type (in dollars)			
Public			
Less-than-2-year	\$ 37,729,257	0.99	\$ 40,072,780
2-year	404,153,510	1.00	401,473,395
4-year non-doctorate-granting	453,062,973	1.00	452,192,315
4-year doctorate-granting	788,002,590	1.01	784,412,732
Private nonprofit			
Less than 4-year	68,168,372	1.01	70,300,924
4-year non-doctorate-granting	611,394,404	1.02	610,392,641
4-year doctorate-granting	317,667,951	1.00	313,355,130
Private for-profit			
Less-than-2-year	667,113,041	1.00	665,887,187
2 years or more	1,121,330,590	1.01	1,108,476,038
Number of fall freshmen, by institution type			
Public			
Less-than-2-year	43,580	1.02	43,363
2-year	1,045,056	1.00	1,039,308
4-year non-doctorate-granting	323,031	1.00	320,880
4-year doctorate-granting	610,185	1.00	607,943
Private nonprofit			
Less than 4-year	36,850	1.01	36,850
4-year non-doctorate-granting	297,938	1.02	297,512
4-year doctorate-granting	192,614	0.99	191,197
Private for-profit			
Less-than-2-year	222,068	0.98	221,174
2 years or more	226,835	1.03	224,368
Fall full-time freshmen enrollment, by institution type			
Public			
Less-than-2-year	26,072	1.02	25,855
2-year	631,054	1.00	628,624
4-year non-doctorate-granting	295,042	0.99	292,891
4-year doctorate-granting	588,974	1.00	587,041
Private nonprofit			
Less than 4-year	32,490	1.01	32,490
4-year non-doctorate-granting	283,273	1.01	282,847
4-year doctorate-granting	187,564	1.00	186,294
Private for-profit			
Less-than-2-year	197,579	0.99	196,685
2 years or more	198,416	1.04	196,903

See notes at end of table.

Table 36. Control totals, weight adjustment factors, and sum of weights for eligible cases for the BPS:04/09 study weight raking adjustment: 2009—Continued

Model predictor variables	Control total	Study weights – average weight adjustment factor	Sum of final weights for eligible cases
Fall full-time freshmen receiving loans, by institution type			
Public			
Less-than-2-year	6,857	0.99	6,798
2-year	106,739	1.00	106,245
4-year non-doctorate-granting	131,331	1.00	131,000
4-year doctorate-granting	259,416	1.01	258,939
Private nonprofit			
Less than 4-year	14,082	1.01	14,082
4-year non-doctorate-granting	174,686	1.02	174,260
4-year doctorate-granting	99,504	1.00	98,419
Private for-profit			
Less-than-2-year	156,729	0.99	156,147
2 years or more	185,989	1.02	184,539
Amount of loans for fall full-time freshmen, by institution type			
Public			
Less-than-2-year	\$ 31,200,693	0.99	\$ 30,812,263
2-year	288,934,194	1.00	287,418,487
4-year non-doctorate-granting	457,974,177	1.00	456,981,660
4-year doctorate-granting	960,248,387	1.01	958,683,761
Private nonprofit			
Less than 4-year	63,879,653	1.01	63,879,653
4-year non-doctorate-granting	782,232,048	1.02	780,073,727
4-year doctorate-granting	506,223,469	1.00	500,662,774
Private for-profit			
Less-than-2-year	671,241,887	0.99	670,258,172
2 years or more	1,051,784,691	1.02	1,046,332,274
Fall full-time freshmen receiving federal grants, by institution type			
Public			
Less-than-2-year	18,751	1.00	18,573
2-year	245,138	1.00	244,510
4-year non-doctorate-granting	104,860	1.02	104,860
4-year doctorate-granting	152,951	1.01	152,073
Private nonprofit			
Less than 4-year	24,491	1.00	24,491
4-year non-doctorate-granting	101,212	1.05	100,945
4-year doctorate-granting	42,725	1.01	42,537
Private for-profit			
Less-than-2-year	193,758	1.01	192,864
2 years or more	157,166	1.00	156,518

See notes at end of table.

Table 36. Control totals, weight adjustment factors, and sum of weights for eligible cases for the BPS:04/09 study weight raking adjustment: 2009—Continued

Model predictor variables	Control total	Study weights – average weight adjustment factor	Sum of final weights for eligible cases
Amount of federal grants for fall full-time freshmen, by institution type			
Public			
Less-than-2-year	\$ 45,841,205	1.00	\$ 45,434,148
2-year	669,724,132	1.00	667,666,709
4-year non-doctorate-granting	314,444,744	1.02	314,444,744
4-year doctorate-granting	462,635,038	1.01	459,752,080
Private nonprofit			
Less than 4-year	79,273,524	1.00	79,273,524
4-year non-doctorate-granting	316,011,424	1.05	315,420,406
4-year doctorate-granting	157,828,815	1.01	157,065,462
Private for-profit			
Less-than-2-year	570,341,901	1.01	570,173,299
2 years or more	433,973,817	1.00	432,959,930

NOTE: Deceased cases are included in the "Control total" column but are not included in the "Sum of final weights for eligible cases" column and as a result the two columns are not identical.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Table 37 summarizes the weight distributions and the variance inflation due to unequal weighting by type of institution. The median student study weight ranges from 67 for students whose base year institution was public less-than-2-year to 220 for students whose base year institution was private for-profit 2 years or more. The mean student study weight ranges from 97 for students whose base year institution was private nonprofit less than 4-year to 309 for students whose base year institution was private for-profit 2 years or more. The unequal weighting effect overall is 2.09, and ranges from 1.34 for students whose base year institution was public 4-year doctorate-granting to 3.06 for students whose base year institution was private nonprofit less than 4-year.

Table 37. Weight distribution and unequal weighting effects for the BPS:04/09 study weight (WTA000), by type of institution: 2009

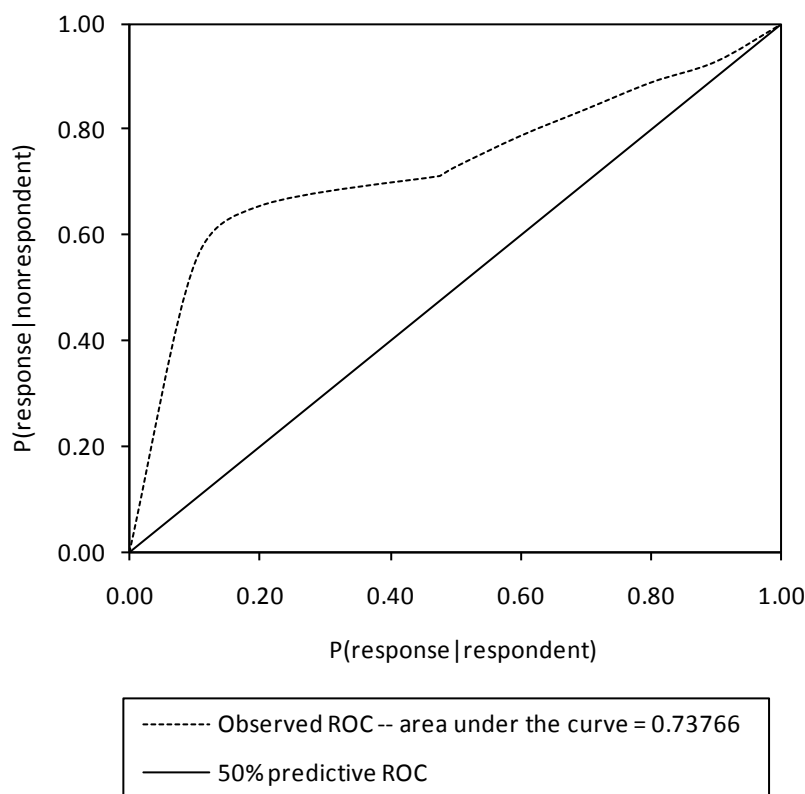
Type of institution	Minimum	First quartile	Median	Third quartile	Maximum	Mean	Unequal weighting effect
Total	0.90	95.19	166.90	270.94	5053.00	224.54	2.09
Institutional sector							
Public							
Less-than-2-year	6.73	36.38	67.12	131.24	934.42	114.82	2.50
2-year	2.63	120.01	202.26	336.16	5053.00	290.28	2.10
4-year non-doctorate-granting	0.90	110.53	210.52	303.96	1962.17	235.24	1.60
4-year doctorate-granting	3.25	127.81	216.88	263.60	1414.91	208.51	1.34
Private nonprofit							
Less than 4-year	1.66	39.36	69.26	111.96	1824.08	96.50	3.06
4-year non-doctorate-granting	1.04	72.15	132.94	192.32	1762.41	155.12	1.83
4-year doctorate-granting	1.27	79.63	115.88	146.90	2164.40	127.18	1.62
Private for-profit							
Less-than-2-year	1.34	24.46	146.13	309.46	1781.71	214.77	2.38
2 years or more	2.85	128.50	219.65	385.73	3095.47	309.05	2.01

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

To assess the overall predictive ability of the nonresponse model, a Receiver Operating Characteristic (ROC) curve was used (Hanley and McNeil 1982). The ROC provides a measure of how well the model correctly classified individuals of known response type. For a more detailed example of the use of the ROC curve in nonresponse modeling, see Iannacchione (2003). The ROC curve was developed by calculating, for any specified probability, c , two proportions:

- the proportion of respondents with a predicted probability of response greater than c , and
- the proportion of nonrespondents with a predicted probability of response greater than c .

The predicted probability of response for each student was the predicted response probability from the weight adjustment model. The plot of the first probability against the second, for c ranging from 0 to 1, resulted in the ROC curve shown in figure 22. The area under the curve measures the probability that a randomly chosen pair of observations—one respondent and one nonrespondent—will be correctly ranked. The probability of a correct pairwise ranking is the same quantity that is estimated by the nonparametric Wilcoxon statistic. The null hypothesis associated with the Wilcoxon statistic is that the variable is not a useful discriminator between the respondent and nonrespondent populations. This corresponds to the null hypothesis that the predicted response probability of a respondent is just as likely to be smaller than the predicted response probability of a nonrespondent as it is to be greater. Thus, if the null hypothesis is true, the ROC curve will be a diagonal line that reflects the equally likely chance of making a correct or incorrect decision, and the area under the curve will be 0.5. If the null hypothesis is not true, the ROC curve will rise above the diagonal and the area under the curve will be significantly greater than 0.5. Figure 22 shows that the area under the ROC curve is 0.74 such that 74 percent of the time (or more than 7 of 10 pairings), the predicted probabilities give the correct classification. The ROC area of 0.74 equals the value of the Wilcoxon test statistic, failing to support the null hypothesis of no predictive ability ($p < 0.05$). This level of discrimination implies that the variables used in the model are highly informative, but not definite predictors of a sample student's overall response propensity.

Figure 22. Receiver operating characteristics (ROC) curve for BPS:04/09 study response propensity: 2009

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

6.1.2 Analysis Weights for Study Respondents to NPSAS:04, BPS:04/06, and BPS:04/09 (Longitudinal or Panel weight)

A weight was also constructed for analyzing the cases who were study respondents to all three of the base-year study (NPSAS:04), the first follow-up study (BPS:04/06), and the second follow-up study (BPS:04/09). This weight is referred to as the “longitudinal” or “panel” weight. As described in the NPSAS:04 Methodology Report (Cominole et al.), NPSAS:04 study respondents were required to have key data items from either the NPSAS:04 student interview or other external data files. The requirements for being a study respondent for BPS:04/09 are described in section 2.5 of this report. BPS:04/06 did not utilize a study respondent definition, but study respondents to BPS:04/06 were defined for this weight as students who had either BPS:04/06 interview data or enrollment data from another source; this is similar to the study respondent definition used for BPS:04/09. Of the 18,640 students who were BPS-eligible at the conclusion of BPS:04/06, after BPS:04/09 data collection there were 110 who were found to be deceased, 16,120 who met the definition of a “panel respondent,” and 2,420 who were considered nonrespondents for the panel analysis weight.

As with the study weight described in section 6.1.1, the initial weight was the BPS:04/06 analysis weight. An adjustment was made for panel nonresponse using a model-based constrained logistic weighting procedure. The weights were then calibrated to the sums of the BPS:04/09 study

weights for eligible cases. The procedure WTADJUST in SUDAAN was used to implement the nonresponse and calibration adjustments.

The first adjustment was for panel nonresponse. The adjustment model included the 18,540 cases who were not deceased; the response indicator was set to 1 for the 16,120 panel respondents and set to 0 for the 2,420 cases who were nondeceased panel nonrespondents. Predictor variables were chosen if considered to be predictive of response status, and were nonmissing for both study respondents and nonrespondents. Variables used in the nonresponse adjustment models for both NPSAS and BPS were also included. Candidate predictor variables included the same set of variables that was used for the study weight (see section 6.1.1).

Variables included in the nonresponse modeling included all of the candidate predictor variables as well as certain important interaction terms identified using CHAID. CHAID was run for up to three segments, resulting in the identification of two-way and three-way interactions. Six variables made up the CHAID interaction terms: whether the student was a BPS:04/06 interview respondent, retention and attainment through 2006, type of aid in the base year, total federal aid in the base year, base year institution type, and the state in which the NPSAS:04 institution is located.

Table 38 shows the predictor variables used in the model to adjust the weight and the average weight adjustment factors resulting from these variables. The nonresponse adjustment factors have the following characteristics:

- Minimum: 1.00;
- Median: 1.02; and
- Maximum: 3.00

Table 38. Weight adjustment factors for nonresponse for the BPS:04/09 longitudinal (panel) weights: 2009

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Total	16,120	85.69	1.15
Type of institution			
Public			
Less-than-2-year	380	71.29	1.39
2-year	5,360	83.63	1.18
4-year non-doctorate-granting	1,560	91.72	1.08
4-year doctorate-granting	2,950	94.97	1.04
Private nonprofit			
Less than 4-year	420	80.26	1.25
4-year	3,640	93.67	1.05
Private for-profit	1,810	69.99	1.47
NPSAS institution control 2003–04			
Public	10,250	87.19	1.13
Private nonprofit	4,060	92.67	1.07
Private for-profit	1,810	69.99	1.47
NPSAS institution level 2003–04			
Less-than-2-year	1,390	65.90	1.53
2-year	6,220	82.73	1.19
4-year	8,510	92.40	1.06
In 12 state NPSAS:04 representative sample			
Yes	8,050	85.11	1.15
No	8,070	86.12	1.16
Bureau of Economic Analysis code (Office of Business Economics [OBE]) region			
New England (CT ME MA NH RI VT)	1,080	87.35	1.13
Mid East (DE DC MD NJ NY PA)	2,390	85.42	1.15
Great Lakes (IL IN MI OH WI)	2,790	87.42	1.13
Plains (IA KS MN MO NE ND SD)	1,710	88.70	1.11
SE (AL AR FL GA KY LA MS NC SC TN VA WV)	3,690	85.62	1.16
Southwest (AZ NM OK TX)	1,650	80.34	1.24
Rocky Mountains (CO ID MT UT WY)	580	89.64	1.14
Far West (AK CA HI NV OR WA)	2,000	85.16	1.18
Other jurisdictions (PR)	240	88.23	1.14
Institution enrollment size			
1,821 or fewer	3,630	78.09	1.29
1,822 to 6,690	4,090	85.84	1.12
6,691 to 16,522	4,130	87.29	1.13
16,523 or more	4,270	89.15	1.10
Age as of 12/31/03			
15–18	7,750	91.15	1.08
19	4,210	89.13	1.11
20–23	1,660	77.50	1.31
24–29	990	73.55	1.36
30 or older	1,510	76.39	1.34

See notes at end of table.

Table 38. Weight adjustment factors for nonresponse for the BPS:04/09 longitudinal (panel) weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Gender			
Male	6,630	84.31	1.17
Female	9,500	86.71	1.14
Race/ethnicity			
White	10,450	88.12	1.12
Black or African American	2,100	82.24	1.21
Hispanic or Latino	1,990	79.71	1.25
Asian	750	86.81	1.17
American Indian or Alaska Native/Native, Hawaiian or other Pacific Islander, Other, More than one race	830	82.23	1.23
Citizenship status 2003–04 (NPSAS)			
US citizen	15,310	86.07	1.15
Resident alien	670	83.32	1.22
Foreign or international student	140	65.14	1.59
Number of institutions attended 2003–04 (NPSAS)			
1	14,970	85.77	1.16
2	1,110	84.00	1.13
3	40	95.96	1.03
Enrollment pattern 2003–04 (NPSAS)			
Enrolled mostly full-time	13,490	87.25	1.14
Enrolled mostly part-time	2,260	80.87	1.24
Enrolled full-time & part-time equally	370	84.37	1.20
Any dependent children 2003–04 (NPSAS)			
Yes	2,210	74.59	1.36
No	13,910	88.08	1.12
Number of family members in college for independent student, or dependent student in 2003–04			
1	3,250	76.12	1.34
2	280	72.91	1.35
3 or 4	40	86.81	1.19
Dependent student	12,550	89.57	1.10
Total income by dependency (categorical) 2003–04			
Dependent			
Less than \$10,000	670	82.93	1.20
\$10,000–\$19,999	1,000	84.40	1.19
\$20,000–\$29,999	1,280	88.07	1.11
\$30,000–\$39,999	1,260	88.32	1.11
\$40,000–\$49,999	1,120	87.61	1.14
\$50,000–\$59,999	1,040	87.92	1.13
\$60,000–\$69,999	1,180	91.88	1.07
\$70,000–\$79,999	890	92.14	1.07
\$80,000–\$99,999	1,530	94.24	1.05
\$100,000 or more	2,570	92.21	1.07

See notes at end of table.

Table 38. Weight adjustment factors for nonresponse for the BPS:04/09 longitudinal (panel) weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Independent			
Less than \$10,000	670	76.59	1.30
\$10,000–\$19,999	1,270	72.37	1.39
\$20,000–\$29,999	610	76.45	1.32
\$30,000–\$49,999	570	79.35	1.28
\$50,000 or more	460	78.56	1.34
Degree plans first year, 2003–04			
Certificate	2,040	70.37	1.44
Associate's degree	4,990	82.95	1.19
Bachelor's degree	7,900	93.08	1.06
No degree	1,200	85.14	1.17
Degree types attained through 2006			
Attained	2,740	85.93	1.18
Never attained	13,380	85.65	1.15
Highest degree attained anywhere, 2006			
Certificate	1,270	76.38	1.32
Associate's or bachelor's degree	1,240	94.01	1.06
Never attained	13,610	85.82	1.15
Persistence and attainment anywhere, 2006			
Attained, still enrolled	1,170	90.90	1.08
Attained, not enrolled	1,570	81.84	1.25
No degree, still enrolled	9,100	92.95	1.06
No degree, not enrolled	4,280	74.35	1.34
Retention and attainment at first institution, 3-year total 2006			
Associate's or bachelor's degree	1,300	94.49	1.06
Certificate	1,150	75.62	1.33
No degree, still enrolled	7,490	92.10	1.07
No degree, transferred or left without return	6,190	79.27	1.24
Parent's highest education level, 2003–04			
Did not complete high school	1,010	79.88	1.28
High school diploma or equivalent	4,020	80.80	1.23
Vocational or technical training	640	86.10	1.16
Less than two years of college	1,260	86.84	1.14
Associate's degree	1,200	85.46	1.16
2 or more years of college but no degree	840	84.65	1.17
Bachelor's degree	3,500	90.63	1.09
Master's degree or equivalent	2,260	90.74	1.08
First-professional degree	420	95.22	1.05
Doctoral degree or equivalent	630	90.72	1.06
Do not know parent's education level	350	76.88	1.32
Applied for any aid, 2003–04			
Yes	14,240	85.50	1.16
No	1,880	86.71	1.15

See notes at end of table.

Table 38. Weight adjustment factors for nonresponse for the BPS:04/09 longitudinal (panel) weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Aid package by type of aid, 2003–04			
Grants only	4,560	86.42	1.15
Loans only	900	86.16	1.20
Work-study only	90	88.30	1.10
Other only	180	83.00	1.21
Grants and loans	3,350	81.95	1.20
Grants and work-study	500	89.50	1.10
Grants and other	240	84.77	1.17
Loans and work-study	80	89.18	1.13
Loans and other	320	93.90	1.11
Work-study and other	10	74.40	1.43
Grants, loans, and work-study	1,190	93.99	1.04
Grants, loans, and other	770	86.46	1.12
Grants, work-study, and other	30	84.26	1.16
Loans, work-study, and other	30	99.96	1.00
Grants, loans, work-study, and other	320	95.99	1.04
No aid received	3,570	84.79	1.18
Pell Grant recipient			
Yes	5,870	81.93	1.20
No	10,260	87.78	1.13
Pell Grant amount received (in dollars)			
None	10,260	87.78	1.13
\$2,000 or less	1,940	81.63	1.22
2,001 to \$3,700	2,020	80.92	1.21
More than \$3,700	1,910	83.55	1.18
Stafford Loan recipient			
Yes	6,550	85.77	1.15
No	9,570	85.65	1.16
Stafford Loan amount received (in dollars)			
None	9,570	85.65	1.16
\$2,625 or less	1,090	84.08	1.16
\$2,625	3,560	93.80	1.06
More than \$2,625	1,900	75.70	1.32
Federal aid recipient			
Yes	9,870	85.35	1.16
No	6,250	86.10	1.15
Federal aid amount received (in dollars)			
None	6,250	86.10	1.15
\$2,831 or less	3,270	85.66	1.15
\$2,832 to \$6,625	3,410	86.46	1.16
More than \$6,625	3,200	83.88	1.16
Institutional aid recipient			
Yes	5,190	91.48	1.07
No	10,930	83.73	1.19

See notes at end of table.

Table 38. Weight adjustment factors for nonresponse for the BPS:04/09 longitudinal (panel) weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
State aid recipient			
Yes	3,940	89.31	1.11
No	12,180	84.74	1.17
PLUS amount received (in dollars)			
None	14,710	85.27	1.16
\$5,825 or less	460	89.38	1.10
\$5,826 to \$10,207	480	91.00	1.08
More than \$10,207	470	93.92	1.06
Data available from Central Processing System (CPS) 2003–04			
Yes	11,980	86.39	1.14
No	4,140	84.20	1.19
In field cluster			
Yes	820	55.48	1.74
No	15,300	88.42	1.12
NPSAS:04 interview respondent			
Yes	15,880	86.91	1.15
No	250	64.98	1.52
BPS:04/06 interview respondent			
Yes	13,900	93.70	1.07
No	2,220	58.11	1.68
Chi-square automatic interaction detection (CHAID) segments			
No degree, no transfer, and not enrolled at first institution anytime in 2005-06			
Base year institution located in AR, OH, KS, WA, PR, AL, IA, CT, DE, IN, KY, OR, or ND and BPS:04/06 interview respondent	590	97.05	1.02
Base year institution located in AR, OH, KS, WA, PR, AL, IA, CT, DE, IN, KY, OR, or ND and BPS:04/06 interview nonrespondent	140	80.33	1.20
Base year institution located in MO, WI, NC, or SC and no federal aid	80	95.46	1.02
Base year institution located in MO, WI, NC, or SC and received federal aid	140	97.53	1.03
Base year institution located in MD, WV, AZ, OK, IL, MS, NH, AK, or AR and BPS:04/06 interview respondent	270	91.50	1.09
Base year institution located in MD, WV, AZ, OK, IL, MS, NH, AK, or AR and BPS:04/06 interview nonrespondent	70	59.83	1.58
Base year institution located in VA, LA, NE, ME, ID, SD, WY, DC, MT, or VT	210	99.49	1.00
Base year institution located in other states and BPS:04/06 interview respondent	1,300	96.03	1.04
Base year institution located in other states and BPS:04/06 interview nonrespondent	280	66.61	1.50

See notes at end of table.

Table 38. Weight adjustment factors for nonresponse for the BPS:04/09 longitudinal (panel) weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
No degree, transferred from first institution by June 2006			
Base year institution located in AR, AZ, IA, CT, IN, KY, MS, NE, WY, UT, NH, AK, VT, FL, TN, OH, VA, WA, PR, or RI and BPS:04/06 interview respondent	870	84.56	1.20
Base year institution located in ID, WV, NJ, PA, OK, AL, DE, IL, WI, LA, MN, NV, NC, OR, SC, DC, MT, or ME and BPS:04/06 interview respondent	650	88.89	1.13
Base year institution located in CO, KS, or MA and BPS:04/06 interview respondent	90	70.22	1.45
Base year institution located in other states and BPS:04/06 interview respondent	790	83.27	1.22
Base year institution located in AR, WV, NJ, CA, OK, NY, NE, NM, DC, MT and BPS:04/06 interview nonrespondent	120	33.53	2.18
Base year institution located in TN, CO, IL, WI, IN, NV, TX, UT, or AK and BPS:04/06 interview nonrespondent	210	58.90	2.09
Base year institution located in MO, MD, PR, AL, DE, or SC and BPS:04/06 interview nonrespondent	30	20.83	1.76
Base year institution located in WA, CT, KY, SD, NC, OR, WY, HI, or ME and BPS:04/06 interview nonrespondent	90	82.89	1.73
Base year institution located in other states and BPS:04/06 interview nonrespondent	240	47.28	2.13
No degree, still enrolled at first institution anytime in 2005-06			
Base year institution located in AR, IA, WI, MS, NE, NV, NC, ME, ND	870	98.35	1.01
Base year institution located in FL, AZ, OK, or NM and BPS:04/06 interview respondent	400	96.95	1.03
Base year institution located in FL, AZ, OK, or NM and BPS:04/06 interview nonrespondent	70	47.01	2.09
Base year institution located in other states and aid package was grants, loans, and work study	370	98.55	1.01
Base year institution located in other states and aid package is loans only, work study only, grants and loans, or loans and work study	1,420	90.33	1.09
Base year institution located in other states and other types of aid packages	1,370	93.61	1.06
Base year institution located in WY, NH, MT, AK, VT, OH, CO, VA, PA, IN, KY, LA, OR, SC, or HI	1,590	95.16	1.05
Base year institution located in WV, NJ, WA, AL, DE, GA, SD, TX, or DC and type of institution is public less-than-2-year, private-for-profit less-than-2-year, or private-for-profit 2 years or more	30	37.56	1.74
Base year institution located in WV, NJ, WA, AL, DE, GA, SD, TX, or DC and type of institution is public 2-year	430	85.11	1.23
Base year institution located in WV, NJ, WA, AL, DE, GA, SD, TX, or DC and type of institution is public 4-year non-doctorate-granting, public 4-year doctorate granting, private nonprofit less than 4-year, private-nonprofit 4-year non-doctorate-granting, or private-nonprofit 4-year doctorate granting.	930	96.92	1.02

See notes at end of table.

Table 38. Weight adjustment factors for nonresponse for the BPS:04/09 longitudinal (panel) weights: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Attained certificate at first institution			
Base year institution located in AR, KS, VA, NJ, IA, GA, WI, KY, LA, MN, NV, NM and BPS:04/06 interview respondent	230	92.28	1.10
Base year institution located in ID, WV, PR, DE, NE, NC, SC, WY, NH, HI, RI, MD, AZ, CT, MS and BPS:04/06 interview respondent	110	76.67	1.52
Base year institution located in PA, MA, UT, DC, ME and BPS:04/06 interview respondent	80	74.20	1.47
Base year institution is located in other states and BPS:04/06 interview respondent	80	34.93	2.74
BPS:04/06 interview nonrespondent	660	85.51	1.20
Attained bachelor's degree at first institution, or attained associate's degree at first institution and base year institution located in FL, KS, MO, WV, CA, AL, IA, DE, IL, NE, NV, OR, WY, OH, ID, CO, WA, KY, LA, MI, SD, NM, NC, SC, NH, HI, MT, RI, or ND	720	94.08	1.06
Attained associate's degree at first institution and base year institution is located in other states and age 23 or younger in 2003	490	95.64	1.04
Attained associate's degree at first institution and base year institution is located in other states and age 24 or older in 2003	90	92.27	1.10

NOTE: Detail may not sum to totals because of rounding. Categories of undergraduate enrollment were determined by quartiles. Categories of Pell grant amount and Stafford loan amount were determined by tertiles.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

To ensure population coverage and consistency with the BPS04/09 study weight, and the BPS:04/06 and NPSAS:04 weights, the BPS:04/09 panel weight was adjusted to control totals determined by the BPS:04/09 study weight sums. Deceased cases were not included in either the control totals or the set of cases in the adjustment. This adjustment was also implemented using the SUDAAN WTADJUST procedure. The control totals for the BPS:04/09 panel weights were obtained by summing the BPS:04/09 study weights (WTA000). The control variables were the same enrollment and aid variables that were used for the BPS:04/09 study weight and the BPS:04/06 analysis weight. Table 39 presents the variables used for the calibration, the values of the control totals, and the average weight adjustment factors for each variable. Statistics for the nonresponse weight adjustment factors are the following:

- Minimum: 0.69;
- Median: 1.00; and
- Maximum: 1.46.

The response-adjusted, calibrated panel weight is the variable WTB000 on the data file.

Table 39. Control totals and sums of weights for eligible cases for the BPS:04/09 panel weight raking adjustment: 2009

Model predictor variables	Control total	Panel weights -- average weight adjustment factor
Total	3,746,295	1.00
Total fall undergraduate enrollment	3,199,574	1.00
Fall enrollment, by institution type		
Public		
Less-than-2-year	43,700	1.04
2-year	1,242,966	1.00
4-year non-doctorate-granting	333,965	0.99
4-year doctorate-granting	623,377	1.00
Private nonprofit		
Less than 4-year	34,623	1.03
4-year non-doctorate-granting	298,554	1.02
4-year doctorate-granting	198,107	0.98
Private for-profit		
Less-than-2-year	200,697	1.01
2 years or more	223,583	1.05
Non-fall enrollment, by institution type		
Public		
Less-than-2-year	43,378	1.03
2-year	1,505,878	1.00
4-year non-doctorate-granting	344,941	0.99
4-year doctorate-granting	614,269	1.00
Private nonprofit		
Less than 4-year	36,717	1.02
4-year non-doctorate-granting	319,078	1.02
4-year doctorate-granting	194,066	0.98
Private for-profit		
Less-than-2-year	208,671	1.00
2 years or more	263,162	1.01
Amount of Pell Grants awarded, by institution type (in dollars)		
Public		
Less-than-2-year	\$ 53,793,325	1.03
2-year	987,176,888	0.99
4-year non-doctorate-granting	326,046,179	1.01
4-year doctorate-granting	420,302,200	1.01
Private nonprofit		
Less than 4-year	82,072,863	1.01
4-year non-doctorate-granting	273,647,143	1.05
4-year doctorate-granting	115,766,595	1.00
Private for-profit		
Less-than-2-year	598,631,871	1.01
2 years or more	492,562,087	0.96

See notes at end of table.

Table 39. Control totals and sums of weights for eligible cases for the BPS:04/09 panel weight raking adjustment: 2009—Continued

Model predictor variables	Control total	Panel weights -- average weight adjustment factor
Amount of Stafford Loans awarded, by institution type (in dollars)		
Public		
Less-than-2-year	\$ 40,072,780	1.05
2-year	401,473,395	0.99
4-year non-doctorate-granting	452,192,315	1.01
4-year doctorate-granting	784,412,732	1.01
Private nonprofit		
Less than 4-year	70,300,924	1.05
4-year non-doctorate-granting	610,392,641	1.03
4-year doctorate-granting	313,355,130	0.98
Private for-profit		
Less-than-2-year	665,887,187	1.00
2 years or more	1,108,476,038	0.99
Number of fall freshmen, by institution type		
Public		
Less-than-2-year	43,363	1.04
2-year	1,039,308	0.99
4-year non-doctorate-granting	320,880	1.00
4-year doctorate-granting	607,943	1.00
Private nonprofit		
Less than 4-year	36,850	1.02
4-year non-doctorate-granting	297,512	1.01
4-year doctorate-granting	191,197	0.98
Private for-profit		
Less-than-2-year	221,174	1.01
2 years or more	224,368	1.06
Fall full-time freshmen enrollment, by institution type		
Public		
Less-than-2-year	25,855	1.05
2-year	628,624	0.99
4-year non-doctorate-granting	292,891	0.99
4-year doctorate-granting	587,041	1.00
Private nonprofit		
Less than 4-year	32,490	1.02
4-year non-doctorate-granting	282,847	1.01
4-year doctorate-granting	186,294	0.98
Private for-profit		
Less-than-2-year	196,685	1.02
2 years or more	196,903	1.06
Fall full-time freshmen receiving loans, by institution type		
Public		
Less-than-2-year	6,798	1.07
2-year	106,245	0.97
4-year non-doctorate-granting	131,000	1.00
4-year doctorate-granting	258,939	1.01
Private nonprofit		
Less than 4-year	14,082	1.07
4-year non-doctorate-granting	174,260	1.02
4-year doctorate-granting	98,419	0.99

See notes at end of table.

Table 39. Control totals and sums of weights for eligible cases for the BPS:04/09 panel weight raking adjustment: 2009—Continued

Model predictor variables	Control total	Panel weights -- average weight adjustment factor
Private for-profit		
Less-than-2-year	156,147	1.02
2 years or more	184,539	1.03
Amount of loans for fall full-time freshmen, by institution type		
Public		
Less-than-2-year	\$ 30,812,263	1.07
2-year	287,418,487	0.97
4-year non-doctorate-granting	456,981,660	1.00
4-year doctorate-granting	958,683,761	1.01
Private nonprofit		
Less than 4-year	63,879,653	1.07
4-year non-doctorate-granting	780,073,727	1.02
4-year doctorate-granting	500,662,774	0.99
Private for-profit		
Less-than-2-year	670,258,172	1.02
2 years or more	1,046,332,274	1.03
Fall full-time freshmen receiving federal grants, by institution type		
Public		
Less-than-2-year	18,573	1.04
2-year	244,510	0.97
4-year non-doctorate-granting	104,860	1.02
4-year doctorate-granting	152,073	1.01
Private nonprofit		
Less than 4-year	24,491	1.00
4-year non-doctorate-granting	100,945	1.04
4-year doctorate-granting	42,537	1.00
Private for-profit		
Less-than-2-year	192,864	1.04
2 years or more	156,518	0.99
Amount of federal grants for fall full-time freshmen, by institution type		
Public		
Less-than-2-year	\$ 45,434,148	1.04
2-year	667,666,709	0.97
4-year non-doctorate-granting	314,444,744	1.02
4-year doctorate-granting	459,752,080	1.01
Private nonprofit		
Less than 4-year	79,273,524	1.00
4-year non-doctorate-granting	315,420,406	1.04
4-year doctorate-granting	157,065,462	1.00
Private for-profit		
Less-than-2-year	570,173,299	1.04
2 years or more	432,959,930	0.99

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Table 40 summarizes the weight distributions and the variance inflation due to unequal weighting by type of institution. The median student study weight ranges from 73 for students whose base year institution was private nonprofit less than 4-year to 236 for students whose base year institution was private for-profit 2 years or more. The mean student study weight ranges from

102 for students whose base year institution was private nonprofit less than 4-year to 325 for students whose base year institution was private-for-profit 2 years or more. The unequal weighting effect overall is 2.22, and ranges from 1.40 for students whose base year institution was public 4-year doctorate-granting to 3.37 for students whose base year institution was private nonprofit less than 4-year.

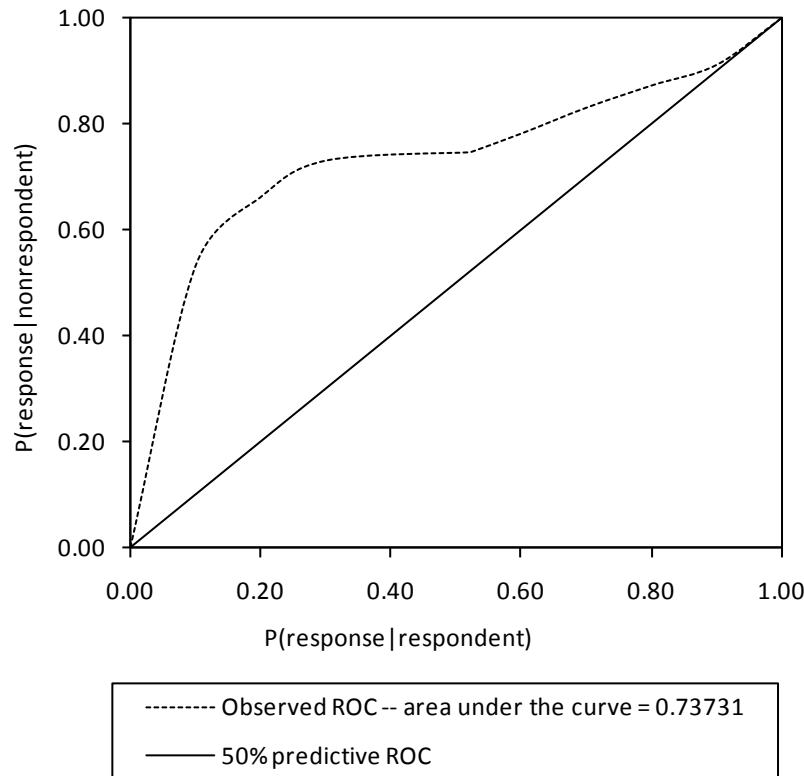
Table 40. Weight distribution and unequal weighting effects for the NPSAS:04 - BPS:04/06 - BPS:04/09 longitudinal study weight, by type of institution: 2009

Type of institution	Minimum	First quartile	Median	Third quartile	Maximum	Mean	Unequal weighting effect
Total	0.91	96.20	169.09	277.18	5299.73	232.36	2.22
Institutional sector							
Public							
Less-than-2-year	6.32	39.25	76.75	145.09	1324.78	128.99	2.58
2-year	2.44	119.58	204.35	348.28	5299.73	301.91	2.24
4-year non-doctorate-granting	0.91	111.98	213.56	311.41	1975.74	239.44	1.64
4-year doctorate-granting	3.12	126.62	216.20	265.98	1611.54	211.25	1.40
Private nonprofit							
Less than 4-year	1.31	40.85	73.44	119.44	2301.75	102.00	3.37
4-year non-doctorate-granting	1.22	72.34	133.05	193.77	1744.19	155.90	1.80
4-year doctorate-granting	1.23	78.50	115.18	146.16	2817.56	128.86	1.79
Private for-profit							
Less-than-2-year	1.19	27.46	153.58	340.11	2937.87	243.95	2.62
2 years or more	2.85	133.83	235.87	381.02	3073.49	324.86	2.07

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

To assess the overall predictive ability of the nonresponse model, an ROC curve, described in section 6.1.1, was used to provide a measure of how well the model correctly classified individuals of known response type. The plot of the first probability against the second (that is, the proportion of respondents with a predicted probability of response greater than c versus the proportion of nonrespondents with a predicted probability of response greater than c), for c ranging from 0 to 1, resulted in the ROC curve shown in figure 23. This figure shows that the area under the ROC curve is 0.74 such that 74 percent of the time (or more than 7 of 10 pairings) the predicted probabilities give the correct classification. The Wilcoxon test ($T = 0.74$) result fails to support the null hypothesis of no predictive ability ($p < 0.05$). This level of discrimination implies that the variables used in the model are highly informative but not definite predictors of a sample student's overall response propensity.

Figure 23. Receiver operating characteristics (ROC) curve for NPSAS:04 - BPS:04/06 - BPS:04/09 longitudinal study response propensity: 2009



SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

6.1.3 Analysis Weights for Cases with Transcript Data

A weight was also constructed for analyzing the cases with transcript data. Of the 18,640 students who were eligible for BPS:04/06, 110 were deceased, 16,960 had some transcript data and met the definition of a “transcript respondent,” and the remaining 1,580 were considered nonrespondents for this weight.

As with the weights described in sections 6.1.1 and 6.1.2, the initial weight was the BPS:04/06 analysis weight. An adjustment was made for nonresponse using a model-based constrained logistic weighting procedure, then the weights were calibrated to the sums of the BPS:04/09 study weights for eligible cases. The procedure WTADJUST in SUDAAN was used to implement the nonresponse and calibration adjustments.

The first adjustment was for nonresponse, that is, not having transcript data. The adjustment model included the 18,540 cases who were not deceased, with the response indicator set to 1 for the 16,960 cases with transcript data and set to 0 for the 1,580 cases who were nondeceased transcript nonrespondents. Predictor variables were chosen if considered to be predictive of response status and were nonmissing for both study respondents and nonrespondents. Variables used in the nonresponse adjustment models for NPSAS and BPS were also included. Candidate predictor variables included the same set of variables that was used for the study weight (see section 6.1.1).

Variables included in the nonresponse modeling included all of the candidate predictor variables as well as certain important interaction terms identified using CHAID was run for up to three segments, resulting in the identification of two-way and three-way interactions. Seven variables that made up the CHAID interaction terms for the student transcript weight adjustment were: the state in which the base year institution is located, type of institution, whether the student was a BPS:04/06 interview respondent, retention and attainment through 2006, base year institution undergraduate enrollment, race/ethnicity, and type of aid package.

Table 41 shows the predictor variables used in the model to adjust the weight and the average weight adjustment factors resulting from these variables. The nonresponse weight adjustment factors have the following characteristics:

- Minimum: 1.00;
- Median: 1.01; and
- Maximum: 3.45

Table 41. Weight adjustment factors for nonresponse for the BPS:04/09 student transcript weight: 2009

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Total	16,960	91.42	1.09
Type of institution			
Public			
Less-than-2-year	400	74.74	1.29
2-year	5,840	91.68	1.08
4-year non-doctorate-granting	1,540	90.41	1.09
4-year doctorate-granting	2,940	95.94	1.04
Private nonprofit			
Less than 4-year	480	89.00	1.12
4-year	3,650	96.25	1.03
Private for-profit	2,110	82.63	1.27
NPSAS institution control 2003-04			
Public	10,720	92.18	1.08
Private nonprofit	4,130	95.71	1.04
Private for-profit	2,110	82.63	1.27
NPSAS institution level 2003-04			
Less-than-2-year	1,550	74.26	1.36
2-year	6,880	91.31	1.09
4-year	8,530	94.54	1.05
In 12 state NPSAS:04 representative sample			
Yes	8,610	92.57	1.07
No	8,340	90.58	1.12
Bureau of Economic Analysis code (Office of Business Economics [OBE]) Region			
New England (CT ME MA NH RI VT)	1,100	90.90	1.10
Mid East (DE DC MD NJ NY PA)	2,470	93.74	1.06
Great Lakes (IL IN MI OH WI)	2,920	91.62	1.09
Plains (IA KS MN MO NE ND SD)	1,700	86.18	1.11
SE (AL AR FL GA KY LA MS NC SC TN VA WV)	3,840	91.20	1.09
Southwest (AZ NM OK TX)	1,910	94.31	1.08
Rocky Mountains (CO ID MT UT WY)	600	96.71	1.05
Far West (AK CA HI NV OR WA)	2,160	87.91	1.14
Other jurisdictions (PR)	270	99.59	1.01
Institution enrollment size			
1,821 or fewer	3,920	85.82	1.18
1,822 to 6,690	4,290	91.95	1.06
6,691 to 16,522	4,310	91.24	1.10
More than 16,522	4,430	94.92	1.03
Age as of 12/31/03			
15–18	7,890	93.53	1.06
19	4,330	92.44	1.08
20–23	1,900	88.50	1.15
24–29	1,150	89.25	1.15
30 or older	1,690	86.63	1.18

See notes at end of table.

Table 41. Weight adjustment factors for nonresponse for the BPS:04/09 student transcript weight: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Gender			
Male	7,090	91.90	1.09
Female	9,870	91.07	1.10
Race/ethnicity			
White	10,820	92.25	1.08
Black or African American	2,200	89.46	1.12
Hispanic or Latino	2,260	89.45	1.14
Asian	780	90.51	1.11
American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, Other, More than one race	890	93.47	1.07
Citizenship status, 2003–04			
US citizen	16,040	91.59	1.09
Resident alien	730	87.30	1.17
Foreign or international student	190	95.72	1.05
Number of institutions attended 2003–04 (NPSAS)			
1	15,670	91.10	1.10
2 or 3	1,290	97.03	1.02
Enrollment pattern 2003–04 (NPSAS)			
Enrolled mostly full-time	14,090	92.05	1.09
Enrolled mostly part-time	2,480	89.67	1.11
Enrolled full-time & part-time equally	390	89.52	1.10
Any dependent children 2003–04 (NPSA)			
Yes	2,490	85.85	1.19
No	14,470	92.62	1.08
Number of family members in college for independent student, or dependent student in 2003–04			
1	3,660	87.91	1.16
2	330	84.85	1.22
3 or 4	40	90.95	1.14
Dependent student	12,920	92.92	1.07
Total income by dependency, 2003–04			
Dependent student			
Less than \$10,000	730	91.42	1.08
\$10,000–\$19,999	1,070	92.51	1.07
\$20,000–\$29,999	1,320	89.92	1.11
\$30,000–\$39,999	1,300	91.91	1.09
\$40,000–\$49,999	1,170	94.67	1.06
\$50,000–\$59,999	1,080	92.22	1.08
\$60,000–\$69,999	1,190	91.49	1.09
\$70,000–\$79,999	910	92.87	1.07
\$80,000–\$99,999	1,550	94.23	1.05
\$100,000 or more	2,610	95.21	1.04

See notes at end of table.

Table 41. Weight adjustment factors for nonresponse for the BPS:04/09 student transcript weight: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Independent student			
Less than \$10,000	770	87.58	1.14
\$10,000–\$19,999	1,450	86.93	1.17
\$20,000–\$29,999	670	87.11	1.17
\$30,000–\$49,999	630	88.20	1.17
\$50,000 or more	510	89.30	1.15
Degree plans first year, 2003–04			
Certificate	2,320	81.66	1.25
Associate's degree	5,440	91.35	1.09
Bachelor's degree	7,890	94.40	1.05
No degree	1,310	91.95	1.08
Degree types attained through 2006			
Certificate only, associate's only, or certificate and associate's	2,640	87.78	1.17
Associate's and bachelor's or bachelor's only	210	93.13	1.06
Never attained	14,100	92.04	1.08
Highest degree attained anywhere, 2006			
Certificate	1,380	82.13	1.26
Associate's	1,260	93.78	1.07
Bachelor's degree	210	93.13	1.06
Never attained	14,100	92.04	1.08
Persistence and attainment anywhere, 2006			
Attained, still enrolled	1,240	93.81	1.07
Attained, not enrolled	1,620	83.46	1.23
No degree, still enrolled	9,150	93.75	1.05
No degree, not enrolled	4,960	89.39	1.12
Retention and attainment at first institution 3-year total 2006			
Bachelor's degree	200	92.69	1.07
Associate's degree	1,100	93.10	1.08
Certificate	1,250	81.45	1.27
No degree, still enrolled	7,470	91.98	1.07
No degree, transferred	3,350	97.31	1.02
No degree, left without return	3,600	88.67	1.14
Parent's highest education level, 2003–04			
Did not complete high school	1,110	85.90	1.18
High school diploma or equivalent	4,380	89.52	1.12
Vocational or technical training	680	93.22	1.07
Less than two years of college	1,310	92.19	1.07
Associate's degree	1,280	93.42	1.07
2 or more years of college but no degree	890	89.89	1.12
Bachelor's degree	3,580	93.59	1.06
Master's degree or equivalent	2,290	93.87	1.06
First-professional degree	420	95.15	1.04
Doctoral degree or equivalent	630	92.66	1.07
Do not know parent's education level	400	87.43	1.17

See notes at end of table.

Table 41. Weight adjustment factors for nonresponse for the BPS:04/09 student transcript weight: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Applied for any aid, 2003–04			
Yes	14,940	91.26	1.09
No	2,010	92.30	1.09
Aid package by type of aid, 2003–04			
Grants only	4,750	91.61	1.09
Loans only	970	91.27	1.13
Work-study only or Work-study and other	110	97.32	1.02
Other only	200	94.23	1.10
Grants and loans	3,600	89.99	1.11
Grants and work-study	520	94.16	1.04
Grants and other	250	92.30	1.09
Loans and work-study	80	94.00	1.05
Loans and other	320	93.26	1.11
Grants, loans, and work-study	1,190	95.13	1.04
Grants, loans, and other	780	87.55	1.13
Grants, work-study, and other	20	82.59	1.27
Loans, work-study, and other with and without grants	340	94.09	1.07
No aid received	3,830	91.46	1.09
Pell Grant recipient			
Yes	6,260	89.32	1.12
No	10,700	92.59	1.08
Pell Grant amount received (in dollars)			
None	10,700	92.59	1.08
\$2,000 or less	2,070	89.43	1.11
\$2,001 to \$3,700	2,170	89.44	1.12
More than \$3,700	2,020	89.03	1.12
Stafford Loan recipient			
Yes	6,870	90.70	1.10
No	10,090	91.81	1.09
Stafford Loan amount received (in dollars)			
None	10,090	91.81	1.09
\$2,624 or less	1,190	89.29	1.10
\$2,625	3,570	94.25	1.06
More than \$2,625	2,110	86.61	1.17
Federal aid recipient			
Yes	10,350	90.83	1.10
No	6,610	92.14	1.08
Federal aid amount received (in dollars)			
None	6,610	92.14	1.08
\$2,831 or less	3,450	92.16	1.09
\$2,832 to \$6,625	3,550	90.33	1.10
More than \$6,625	3,340	89.77	1.11
Institutional aid recipient			
Yes	5,250	94.44	1.05
No	11,710	90.40	1.11

See notes at end of table.

Table 41. Weight adjustment factors for nonresponse for the BPS:04/09 student transcript weight: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
State aid recipient			
Yes	4,120	94.55	1.05
No	12,830	90.60	1.10
PLUS amount received (in dollars)			
None	15,540	91.50	1.09
Less than \$5,825	460	85.31	1.12
\$5,825 to \$10,207	490	91.92	1.10
More than \$10,207	470	94.46	1.07
Data available from Central Processing System (CPS), 2003–04			
Yes	12,470	91.15	1.10
No	4,480	92.02	1.08
In BPS:04/09 field cluster			
Yes	1,210	85.04	1.18
No	15,740	92.00	1.09
NPSAS:04 interview respondent			
Yes	16,620	91.63	1.09
No	340	87.89	1.16
BPS:04/06 interview respondent			
Yes	13,700	92.24	1.08
No	3,260	88.60	1.14
Chi-square automatic interaction detection (CHAID) segments			
Base year institution located in AR, AZ, NY, TX and is public 2-year, public 4-year non-doctorate-granting, or public 4-year doctorate-granting	1,840	98.13	1.02
Base year institution located in WA, LA, NE, OR, UT and is public 2-year, public 4-year non-doctorate-granting, or public 4-year doctorate-granting	970	94.96	1.04
Base year institution located in DE or PA and is public 2-year, public 4-year non-doctorate-granting, or public 4-year doctorate-granting	420	99.76	1.00
Base year institution located in AR, AZ, PA, NY, WA, DE, LA, NE, OR, TX, or UT			
Institution type is public less-than-2-year, private nonprofit less than 4-year, private nonprofit non-doctorate-granting, or private for-profit 2 years or more	1,190	99.05	1.01
Institution type is private nonprofit 4-year doctorate-granting and undergraduate enrollment is less than 4,178	140	97.05	1.03
Institution type is private nonprofit 4-year doctorate-granting and undergraduate enrollment is between 4,178 and 6,646	60	98.01	1.02
Institution type is private nonprofit 4-year doctorate-granting and undergraduate enrollment is more than 6,646	400	98.64	1.01
Base year institution located in AR, WA, DE, LA, NE, TX and is private for-profit less-than-2-year	280	84.51	1.19
Base year institution located in AZ, NY, OR, PA, UT and is private for-profit less-than-2-year	110	50.10	2.07

See notes at end of table.

Table 41. Weight adjustment factors for nonresponse for the BPS:04/09 student transcript weight: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Base year institution located in FL or IA	1,120	94.30	1.06
Base year institution located in TN, OH, CO, MD, IL, WI, MA, RI and undergraduate enrollment 593 or fewer students	300	63.94	1.49
Base year institution located in CO, IL, MA, OH, MD, WI, RI, TN and undergraduate enrollment is between 593 and 4,178 students	960	92.82	1.07
Base year institution located in OH, CO, MD, IL, WI, MA, RI and undergraduate enrollment is between 4,178 and 6,646 students	330	97.30	1.02
Base year institution located in TN or CO and undergraduate enrollment is between 6,646 and 9,971 students	70	77.53	1.25
Base year institution located in IL, OH, MD, MA, RI, WI and undergraduate enrollment is between 6,646 and 9,971 students	240	84.55	1.17
Base year institution located in TN, OH, CO, MD, IL, WI, MA, RI and undergraduate enrollment between 9,971 and 14,068	310	92.88	1.06
Base year institution located in TN, OH, CO, MD, IL, WI, MA, RI and undergraduate enrollment more than 14,068 students, or base year institution located in ID, SD, NM, WY, MT, AK, VT	1,370	98.03	1.02
Base year institution located in KS, NJ, CA, OK, AL, CT, KY, OK Undergraduate enrollment less than or equal to 593 and aid package is grants, loans, work study; loans only; loans and work study; grants and work study; or loans and other type of aid	70	95.12	1.06
Undergraduate enrollment less than or equal to 593 and aid package is no aid; grants only; other aid only; grants, works study and other aid; grants, loans, or grants, loans, work study, and other aid	80	47.23	2.06
Undergraduate enrollment less than or equal to 593 and other types of aid package	140	67.03	1.51
Undergraduate enrollment between 593 and 1,485	280	73.45	1.38
Undergraduate enrollment between 1,485 and 2,406	250	99.22	1.01
Undergraduate enrollment between 2,406 and 4,178	330	93.70	1.07
Undergraduate enrollment between 4,178 and 14,068	730	79.14	1.24
Undergraduate enrollment between 14,068 and 28,881	610	93.53	1.05
Undergraduate enrollment more than 28,881 and race/ethnicity is white or black	70	71.45	1.34
Undergraduate enrollment more than 28,881 and race/ethnicity other than white or black	130	92.72	1.06
Base year institution located in MO or WV Undergraduate enrollment less than or equal 4,178 students	130	88.50	1.11
Undergraduate enrollment more than 4,178 students	160	53.27	1.88

See notes at end of table.

Table 41. Weight adjustment factors for nonresponse for the BPS:04/09 student transcript weight: 2009—Continued

Model predictor variables	Number of respondents	Weighted response rate	Average weight adjustment factor
Base year institution located in VA, MS, DC, ND			
Undergraduate enrollment less than or equal 6,646	310	83.35	1.21
Undergraduate enrollment more than 6,646 and not enrolled in 2006	60	46.30	1.91
Undergraduate enrollment more than 6,646 and enrolled in 2006	150	67.48	1.53
Base year institution located in PR, GA, MN, SC, HI			
Undergraduate enrollment less than or equal to 593	110	95.11	1.05
Undergraduate enrollment more than 593	1,740	99.79	1.00
Base year institution located in IN, MI, NV, NC, NH, ME			
Undergraduate enrollment less than or equal to 593 and BPS:04/06 interview respondent	110	95.88	1.05
Undergraduate enrollment less than or equal to 593 and BPS:04/06 interview nonrespondent	50	71.29	1.37
Undergraduate enrollment between 593 and 2,406	260	99.68	1.00
Undergraduate enrollment between 2,406 and 14,068	410	98.99	1.01
Undergraduate enrollment more than 14,068	690	99.55	1.01

NOTE: Detail may not sum to totals because of rounding. Categories of undergraduate enrollment were determined by quartiles. Categories of Pell grant amount and Stafford loan amount were determined by tertiles.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

To ensure population coverage and consistency with the BPS04/09 study weight, and the BPS:04/06 and NPSAS:04 weights, the BPS:04/09 panel transcript was adjusted to control totals determined by the BPS:04/09 study weight sums. Cases which were deceased were not included in either the control totals or in the cases included in the adjustment. This adjustment was also implemented using the SUDAAN WTADJUST procedure. Variables used to define the control totals were the same as those used for the poststratification coverage adjustments for the BPS:04/09 study weight. The control totals for the BPS:04/09 transcript weights were established by the weighted sums from the BPS:04/09 study weights.

Table 42 gives the variables used for the calibration, the values of the control totals, and the average weight adjustment factors for each variable. Statistics for the weight adjustment factors are the following:

- Minimum: 0.67,
- Median: 1.00, and
- Maximum: 1.23

The response adjusted, calibrated transcript weight is the variable WTC000 on the data file.

Table 42. Control totals and sums of weights for eligible cases for the BPS:04/09 student transcript weight raking: 2009

	Control total	Panel weights -- average weight adjustment factor
Total	3,746,295	1.00
Total fall undergraduate enrollment	3,199,574	1.00
Fall enrollment, by institution type		
Public		
Less-than-2-year	43,700	0.99
2-year	1,242,966	1.00
4-year non-doctorate-granting	333,965	0.98
4-year doctorate-granting	623,377	1.01
Private nonprofit		
Less than 4-year	34,623	0.97
4-year non-doctorate-granting	298,554	1.00
4-year doctorate-granting	198,107	1.00
Private for-profit		
Less-than-2-year	200,697	0.99
2 years or more	223,583	1.00
Non-fall enrollment, by institution type		
Public		
Less-than-2-year	43,378	0.99
2-year	1,505,878	1.00
4-year non-doctorate-granting	344,941	0.98
4-year doctorate-granting	614,269	1.01
Private nonprofit		
Less than 4-year	36,717	0.97
4-year non-doctorate-granting	319,078	1.00
4-year doctorate-granting	194,066	1.00
Private for-profit		
Less-than-2-year	208,671	0.99
2 years or more	263,162	1.00
Amount of Pell Grants awarded, by institution type (in dollars)		
Public		
Less-than-2-year	\$ 53,793,325	1.00
2-year	987,176,888	1.00
4-year non-doctorate-granting	326,046,179	0.96
4-year doctorate-granting	420,302,200	1.02
Private nonprofit		
Less than 4-year	82,072,863	0.99
4-year non-doctorate-granting	273,647,143	0.99
4-year doctorate-granting	115,766,595	1.01
Private for-profit		
Less-than-2-year	598,631,871	1.01
2 years or more	492,562,087	1.01
Amount of Stafford Loans awarded, by institution type (in dollars)		
Public		
Less-than-2-year	\$ 40,072,780	0.92
2-year	401,473,395	1.00
4-year non-doctorate-granting	452,192,315	0.98
4-year doctorate-granting	784,412,732	1.01

See notes at end of table.

Table 42. Control totals and sums of weights for eligible cases for the BPS:04/09 student transcript weight raking: 2009—Continued

	Control total	Panel weights -- average weight adjustment factor
Private nonprofit		
Less than 4-year	70,300,924	0.96
4-year non-doctorate-granting	610,392,641	1.00
4-year doctorate-granting	313,355,130	0.99
Private for-profit		
Less-than-2-year	665,887,187	0.98
2 years or more	1,108,476,038	1.01
Number of fall freshmen, by institution type		
Public		
Less-than-2-year	43,363	0.99
2-year	1,039,308	1.00
4-year non-doctorate-granting	320,880	0.98
4-year doctorate-granting	607,943	1.01
Private nonprofit		
Less than 4-year	36,850	0.97
4-year non-doctorate-granting	297,512	1.00
4-year doctorate-granting	191,197	1.00
Private for-profit		
Less-than-2-year	221,174	0.99
2 years or more	224,368	0.99
Fall full-time freshmen enrollment, by institution type		
Public		
Less-than-2-year	25,855	0.99
2-year	628,624	0.99
4-year non-doctorate-granting	292,891	0.98
4-year doctorate-granting	587,041	1.01
Private nonprofit		
Less than 4-year	32,490	0.97
4-year non-doctorate-granting	282,847	1.00
4-year doctorate-granting	186,294	1.00
Private for-profit		
Less-than-2-year	196,685	0.98
2 years or more	196,903	0.99
Fall full-time freshmen receiving loans, by institution type		
Public		
Less-than-2-year	6,798	0.91
2-year	106,245	1.00
4-year non-doctorate-granting	131,000	0.97
4-year doctorate-granting	258,939	1.01
Private nonprofit		
Less than 4-year	14,082	0.95
4-year non-doctorate-granting	174,260	1.00
4-year doctorate-granting	98,419	0.99
Private for-profit		
Less-than-2-year	156,147	0.97
2 years or more	184,539	0.99

See notes at end of table.

Table 42. Control totals and sums of weights for eligible cases for the BPS:04/09 student transcript weight raking: 2009—Continued

	Control total	Panel weights -- average weight adjustment factor
Amount of loans for fall full-time freshmen, by institution type		
Public		
Less-than-2-year	\$ 30,812,263	0.91
2-year	287,418,487	1.00
4-year non-doctorate-granting	456,981,660	0.97
4-year doctorate-granting	958,683,761	1.01
Private nonprofit		
Less than 4-year	63,879,653	0.95
4-year non-doctorate-granting	780,073,727	1.00
4-year doctorate-granting	500,662,774	0.99
Private for-profit		
Less-than-2-year	670,258,172	0.97
2 years or more	1,046,332,274	0.99
Fall full-time freshmen receiving federal grants, by institution type		
Public		
Less-than-2-year	18,573	1.00
2-year	244,510	1.00
4-year non-doctorate-granting	104,860	0.96
4-year doctorate-granting	152,073	1.01
Private nonprofit		
Less than 4-year	24,491	0.99
4-year non-doctorate-granting	100,945	0.98
4-year doctorate-granting	42,537	1.00
Private for-profit		
Less-than-2-year	192,864	1.00
2 years or more	156,518	1.00
Amount of federal grants for fall full-time freshmen, by institution type		
Public		
Less-than-2-year	\$ 45,434,148	1.00
2-year	667,666,709	1.00
4-year non-doctorate-granting	314,444,744	0.96
4-year doctorate-granting	459,752,080	1.01
Private nonprofit		
Less than 4-year	79,273,524	0.99
4-year non-doctorate-granting	315,420,406	0.98
4-year doctorate-granting	157,065,462	1.00
Private for-profit		
Less-than-2-year	570,173,299	1.00
2 years or more	432,959,930	1.00

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Table 43 summarizes the weight distributions and the variance inflation due to unequal weighting by type of institution. The median student study weight ranges from 63 for students whose base year institution was private nonprofit less than 4-year to 219 for students whose base year institution was public 4-year doctorate-granting. The mean student study weight ranges from 87 for students whose base year institution was private nonprofit less than 4-year to 277 for students whose base year institution was public 2-year. The unequal weighting effect overall is 2.01,

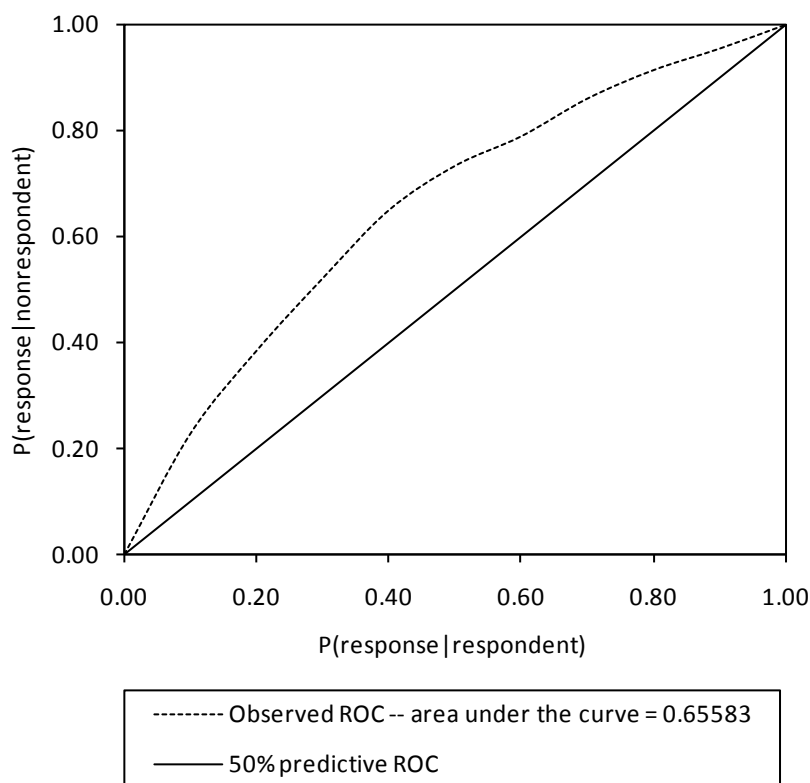
and ranges from 1.33 for students whose base year institution was public 4-year doctorate-granting to 2.77 for students whose base year institution was public less-than-2-year.

Table 43. Weight distribution and unequal weighting effects for the BPS:04/09 student transcript weight, by type of institution: 2009

Type of institution	Minimum	First quartile	Median	Third quartile	Maximum	Mean	Unequal weighting effect
Total	0.85	92.45	164.48	269.91	4264.70	220.96	2.01
Institutional sector							
Public							
Less-than-2-year	2.63	38.71	67.96	135.73	1292.43	119.53	2.77
2-year	2.06	112.55	194.74	324.79	4264.70	276.86	2.04
4-year non-doctorate-granting	0.85	110.86	202.11	313.91	1722.45	241.41	1.60
4-year doctorate-granting	3.15	129.18	218.77	271.90	1434.43	213.21	1.33
Private nonprofit							
Less than 4-year	1.28	35.36	63.04	104.64	1367.86	87.12	2.69
4-year non-doctorate-granting	1.03	70.62	135.68	194.79	1676.03	154.62	1.78
4-year doctorate-granting	1.55	79.98	117.67	152.19	1707.31	130.41	1.53
Private for-profit							
Less-than-2-year	1.29	25.68	138.95	315.84	3353.31	216.53	2.45
2 years or more	2.43	119.18	200.58	333.14	3289.90	270.63	1.95

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

To assess the overall predictive ability of the nonresponse model, an ROC curve was again used to provide a measure of how well the model correctly classified individuals of known response type. The plot of the first probability against the second (that is, the proportion of respondents with a predicted probability of response greater than c versus the proportion of nonrespondents with a predicted probability of response greater than c), for c ranging from 0 to 1, resulted in the ROC curve shown in figure 24. The area under the ROC curve is 0.66, such that 66 percent of the time (or almost 7 of 10 pairings), the predicted probabilities give the correct classification. The ROC area of 0.66 equals the value of the Wilcoxon test statistic; the Wilcoxon test fails to support the null hypothesis of no predictive ability ($p < 0.05$). This level of discrimination implies that the variables used in the model are highly informative but not definite predictors of a sample student's overall response propensity.

Figure 24. Receiver operating characteristics (ROC) curve for BPS:04/09 transcript response propensity: 2009

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

6.2 Variance Estimation

For probability-based sample surveys, most estimates are nonlinear statistics. For example, the estimate of a mean or proportion, which is expressed as

$$\bar{m} = \frac{\sum_i w_i x_i}{\sum_i w_i y_i},$$

is nonlinear because the denominator is a survey estimate of the (unknown) population total. In this situation, the variances of the estimates cannot be expressed in closed form. Two procedures for estimating variances of survey statistics are the Taylor series linearization procedure and the bootstrap replication procedure. Variables to use for both of these variance estimation procedures are available on the BPS:04/09 data files. The analysis strata and replicates created for the Taylor series procedure are discussed in section 6.2.1, and section 6.2.2 discusses the replicate weights created for the bootstrap procedure.

6.2.1 Taylor Series

The Taylor series variance estimation procedure is a well-known technique used to estimate the variances of nonlinear statistics. The procedure takes the first-order Taylor series approximation

of the nonlinear statistic and substitutes the linear representation into the appropriate variance formula based on the sample design. Woodruff (1971) presented the mathematical formulation of this procedure. NPSAS:04 provided two sets of variables for Taylor series variance estimation, and BPS:04/09 also provides two sets of variables. One set of variables is used in software that assumes that the first stage sampling units (institutions) were sampled with replacement, and does not account for the finite population correction (FPC) at the institution level of sampling. The other set of variables is used in software that will account for without replacement sampling of institutions in the calculation of variances, and does account for the FPC. Both sets of variables are provided because not all survey data analysis packages have the option to incorporate the FPC in the variance calculations. When the first stage units are sampled with very small probabilities, the estimated variances using the with replacement variance formulas and the without replacement variance formulas are almost the same, but in NPSAS:04, some institutions were sampled with high sampling probabilities.

The first set of variables described assumes that the first stage units were sampled with replacement (or with small selection probabilities). For stratified multistage surveys, the Taylor series procedure requires variance estimation strata and variance estimation primary sampling units (PSUs), also called *replicates*, defined from the sampling strata and PSUs used in the first stage of sampling. Because BPS:04/09 is a follow-up study of both NPSAS:04 and BPS:04/06, the variance estimation strata and PSUs for BPS:04/06 and BPS:04/09 were derived from the variance estimation strata and PSUs that were developed for NPSAS:04. The steps in the construction of the NPSAS:04 and BPS:04/06 stratum and PSU variables are described in chapter 6 of the NPSAS:04 Full-scale Methodology Report (Cominole et al. 2006) and chapter 6 of the BPS:04/06 Full-scale Methodology Report (Cominole et al. 2007).

The variance estimation formulas require at least two PSUs in each stratum. The NPSAS:04 variance estimation strata and PSUs were examined for the BPS:04/09 sample, and strata with only one PSU were combined with other strata to obtain at least two PSUs. The following three rules were used: variance estimation strata were combined with other variance estimation strata within the original NPSAS:04 sampling strata, certainty schools were combined with other certainty schools, and noncertainty schools were combined with other noncertainty schools. In addition, the original sort order that was used for constructing the NPSAS:04 variance estimation strata and PSUs was used. A variance estimation stratum was combined with the next stratum in the sorted list. If the stratum was the first in the sorted list, then it was combined with the next stratum in the list. The single PSU then became an additional PSU in the new variance estimation strata. The resulting variance estimation strata and PSUs for BPS:04/09 analyses using the study, panel, or transcript weight are the variables BPS09STR and BPS09PSU.

The second set of variables that were created are to be used with software that allow for approximating variances using without replacement sampling and account for the FPC (which may reduce the estimate of the variance contribution at the first stage of sampling). The variables FB09STR, FB09PSU, FB09SSU and B9PSUCNT are comparable to the NPSAS:04 variables FANALSTR, FANALPSU, FANALSSU, and PSUCOUNT, and were constructed in a similar manner. Ideally, the BPS:04/09 versions of these variables would be identical to the NPSAS:04 versions. In general, for certainty institutions, FB09STR equals the institutional sampling stratum, FANALPSU equals BPS09STR, and FANALSSU equals BPS09SSU. In the noncertainty institutions, FB09STR equals BPS09STR, FB09PSU equals BPS09PSU, and FB09SSU equals FANALSSU (which was created by randomly dividing the NPSAS:04 analysis PSUs into two parts). These variables are a by-product of the Kaufman (2004) methodology for the bootstrap variance

estimation weights (described in section 6.2.2), and the justification for using the without replacement variance formulas follows from the assumptions in that paper. Some values of the variance estimation strata, PSU, and SSU variables were combined in order to have at least 2 SSUs in each PSU, and at least 2 PSUs in each stratum.

An alternate variance estimation method using bootstrap replicate weights is also provided for users of the BPS:04/09 data, as described in section 6.2.2. Table 44 summarizes the weight and variance estimation variables and how they are used in selected software packages that allow for Taylor series variance estimation (SUDAAN, Stata, the SAS survey data analysis procedures, and IBM SPSS Complex Samples) and bootstrap variance estimation (SUDAAN, Stata, the SAS survey data analysis procedures, and WesVar). Variance estimates and design effects given in appendices in this report were produced using the bootstrap replicate weights.

Table 44. Use of analysis weights, replicate weights, and variance estimation strata and primary sampling unit (PSU) variables available from BPS:04/09 in selected survey data analysis software: 2009

Survey data analysis software	BPS:04/09 study respondents; NPSAS:04 and BPS:04/09 study respondents	Study respondents to all three of NPSAS:04, BPS:04/06, and BPS:04/09	Students with at least one transcript at BPS:04/09
Analysis weight for estimates	WTA000	WTB000	WTC000
Taylor series variance estimation (with replacement)			
Variance estimation strata and PSU variables	BPS09STR and BPS09PSU	BPS09STR and BPS09PSU	BPS09STR and BPS09PSU
Software: statements, parameters, and keywords for Taylor series variance estimation (with replacement)			
SUDAAN	DESIGN = WR WEIGHT WTA000; NEST BPS09STR BPS09PSU;	DESIGN = WR WEIGHT WTB000; NEST BPS09STR BPS09PSU;	DESIGN = WR WEIGHT WTC000; NEST BPS09STR BPS09PSU;
Stata	svyset BPS09PSU [pweight = WTA000], strata (BPS09STR) vce(LINEARIZED)	svyset BPS09PSU [pweight = WTB000], strata (BPS09STR) vce(LINEARIZED)	svyset BPS09PSU; [pweight = WTC000], strata (BPS09STR) vce(LINEARIZED)
SAS survey analysis procedures	VARMETHOD = JACKKNIFE WEIGHT WTA000; STRATA BPS09STR; CLUSTER BPS09PSU;	VARMETHOD = JACKKNIFE WEIGHT WTB000; STRATA BPS09STR; CLUSTER BPS09PSU;	VARMETHOD = JACKKNIFE WEIGHT WTC000; STRATA BPS09STR; CLUSTER BPS09PSU;
IBM SPSS complex samples	Method: WR Weight: WTA000 Strata: BPS09STR PSU: BPS09PSU	Method: WR Weight: WTB000 Strata: BPS09STR PSU: BPS09PSU	Method: WR Weight: WTC000 Strata: BPS09STR PSU: BPS09PSU
Taylor series variance estimation (without replacement)			
Variance estimation strata, PSU, SSU, and count variables	FB09STR, FB09PSU, FB09SSU, and B9PSUCNT	FB09STR, FB09PSU, FB09SSU, and B9PSUCNT	FB09STR, FB09PSU, FB09SSU, and B9PSUCNT
Software: statements, parameters, and keywords for Taylor series variance estimation (without replacement)			
SUDAAN	DESIGN = WOR WEIGHT WTA000; NEST FB09STR FB09PSU FB09SSU; TOTCNT B9PSUCNT _minus1__zero_;	DESIGN = WOR WEIGHT WTB000; NEST FB09STR FB09PSU FB09SSU; TOTCNT B9PSUCNT _minus1__zero_;	DESIGN = WOR WEIGHT WTC000; NEST FB09STR FB09PSU FB09SSU; TOTCNT B9PSUCNT _minus1__zero_;
Stata	svyset FB09PSU [pw=WTA000], strata(FB09STR) fpc(PSUCOUNT) FB09SSU, vce(LINEARIZED)	svyset FB09PSU [pw=WTB000], strata(FB09STR) fpc(PSUCOUNT) FB09SSU, vce(LINEARIZED)	svyset FB09PSU [pw=WTC000], strata(FB09STR) fpc(PSUCOUNT) FB09SSU, vce(LINEARIZED)
Bootstrap variance estimation			
Replicate weight variables	WTA001 – WTA200	WTB001 – WTB200	WTC001 – WTC200
Software: statements, parameters, and keywords for BRR variance estimation			
SUDAAN	DESIGN = BRR WEIGHT WTA000; REPWGT WTA001 – WTA200;	DESIGN = BRR WEIGHT WTB000; REPWGT WTB001 – WTB200;	DESIGN = BRR WEIGHT WTC000; REPWGT WTC001 – WTC200;

See notes at end of table.

Table 44. Use of analysis weights, replicate weights, and variance estimation strata and primary sampling unit (PSU) variables available from BPS:04/09 in selected survey data analysis software: 2009—Continued

Survey data analysis software	BPS:04/09 study respondents; NPSAS:04 and BPS:04/09 study respondents	Study respondents to all three of NPSAS:04, BPS:04/06, and BPS:04/09	Students with at least one transcript at BPS:04/09
Stata	svyset [pweight=WTA000], brrweight(WTA001 - WTA200) vce(BRR)	svyset [pweight=WTB000], brrweight(WTB001 - WTB200) vce(BRR)	svyset [pweight=WTC000], brrweight(WTC001 - WTC200) vce(BRR)
SAS survey data analysis procedures	VARMETHOD = BRR WEIGHT WTA000; REPWEIGHTS WTA001 – WTA200;	VARMETHOD = BRR WEIGHT WTB000; REPWEIGHTS WTB001 – WTB200;	VARMETHOD = BRR WEIGHT WTC000; REPWEIGHTS WTC001 – WTC200;
WesVar	Method: BRR Full sample weight: WTA000 Replicates: WTA001 – WTA200	Method: BRR Full sample weight: WTB000 Replicates: WTB001 – WTB200	Method: BRR Full sample weight: WTC000 Replicates: WTC001 – WTC200

Note: The survey data analysis software specifications are given for the following versions of the software packages: SUDAAN 10.0.1, Stata 12, SAS 9.2, IBM SPSS complex samples 20, and WesVar 4.3.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

6.2.2 Bootstrap Replicate Weights

The variance estimation strategy that was chosen for BPS:04/09 is the same as that used for NPSAS:04 and BPS:04/06 and satisfies the following requirements:

- recognition of variance reduction due to stratification at all stages of sampling;
- recognition of the effects of unequal weighting;
- recognition of possible increased variance due to sample clustering;
- recognition of the effects of weight adjustments for nonresponse and for calibration of selected total estimates to known external totals;
- satisfactory properties for estimating variances of nonlinear statistics and quantiles (such as the median) as well as for linear statistics;
- ability to apply finite population corrections at the institution stage of sampling and reflect the reduction in variance due to the high sampling rates in some first-stage sampling strata; and
- ability to test hypotheses about students based on normal distribution theory by ignoring the finite population corrections at the student level of sampling.

Commonly applied bootstrap variance estimation techniques satisfy the first five requirements. To meet the last two requirements as well, a methodology developed by Kaufman (2004) was applied, allowing for finite population correction factors at two stages of sampling. The application of Kaufman's method, which was used for NPSAS:04 and also BPS:04/06 and BPS:04/09, incorporated the finite population correction factor at the first stage only, where sampling fractions were generally high. At the second stage, where the sampling fractions were generally low, the finite population correction factor was set to 1.00.

The Kaufman methodology was used to develop a vector of bootstrap sample weights that was added to the analysis file. These weights are zero for units not selected in a particular bootstrap

sample; weights for other units are inflated for the bootstrap subsampling. The initial analytic weights for the complete sample are also included for the purposes of computing the desired estimates. The vector of replicate weights allows for computing additional estimates for the sole purpose of estimating a variance. Assuming B sets of replicate weights, the variance of any estimate, $\hat{\theta}$, can be estimated by replicating the estimation procedure for each replicate and computing a simple variance of the replicate estimates, as follows:

$$\text{var}(\hat{\theta}) = \frac{\sum_{b=1}^B (\hat{\theta}_b^* - \hat{\theta})^2}{B},$$

where $\hat{\theta}_b^*$ is the estimate based on the b th replicate weight and B is the total number of sets of replicate weights. Once the replicate weights are provided, this estimate can be produced by most survey software packages (e.g., SUDAAN [RTI International 2008] computes this estimate by invoking the DESIGN = BRR option).

The number of replicate weights was set at 200 for each of the NPSAS:04, BPS:04/06, and BPS:04/09 analysis weights, based on work that showed that this number of replicates has desirable properties for variance estimation in regression analyses. For the 200 replicate weights included on the weights file, both the nonresponse adjustment and the calibration process was repeated so that the variance of survey estimates would include the variability due to the weight adjustments. The analysis and replicate weights that are available on the weights file for BPS:04/09 are the following:

Type of respondents	Analysis weight	Replicate weights
Study respondents	WTA000	WTA001–WTA200
Panel respondents	WTB000	WTB001–WTB200
Cases with transcript data	WTC000	WTC001–WTC200

6.3 Overall Weighted and Unweighted Response Rates

The overall BPS:04/09 response rate is an estimate of the proportion of the study population directly represented by the respondents. Because the BPS:04/09 study includes a subsample of NPSAS:04 nonrespondents, the overall BPS:04/09 response rate is the product of the NPSAS:04 institution-level response rate times the BPS:04/09 student-level study response rate. Therefore, the overall BPS:04/09 response rates can only be estimated directly for defined institutional characteristics.

Table 45 gives the unweighted and weighted NPSAS:04 base-year institution and BPS:04/09 student response rate components by type of institution. The types of student respondents included in table 45 are the following:

- BPS:04/09 study respondents;
- BPS:04/09 interview respondents;
- Panel respondents (i.e., study respondents to all three of NPSAS:04, BPS:04/06, and BPS:04/09); and
- BPS:04/09 transcript respondents (i.e., cases with any transcript data).

Table 45. Unweighted and weighted NPSAS:04 institution response rates and BPS:04/09 student study, interview, panel, and transcript response rates, by type of institution: 2009

Type of institution (base year)	Institution response rate		Eligible sample size Respondents		Response rate		Overall response rate	
	Un-weighted	Weighted			Un-weighted	Weighted	Un-weighted	Weighted
BPS:04/09 study respondents								
Total	83.5	80.0	18,540	16,680	90.0	89.2	75.1	71.3
Public								
Less-than-2-year	76.6	74.3	540	430	79.3	79.0	60.7	58.7
2-year	85.4	77.6	6,310	5,570	88.3	87.7	75.4	68.0
4-year non-doctorate-granting	85.1	70.3	1,690	1,590	94.3	93.4	80.2	65.7
4-year doctorate-granting	86.3	87.1	3,070	2,990	97.3	96.7	84.0	84.3
Private nonprofit								
Less-than-4-year	89.0	92.6	530	440	83.4	85.5	74.3	79.2
4-year non-doctorate-granting	81.9	78.1	2,280	2,190	96.1	94.4	78.7	73.7
4-year doctorate-granting	77.7	80.8	1,520	1,490	98.0	97.5	76.2	78.8
Private for-profit								
Less-than-2-year	84.0	82.3	1,450	1,070	74.2	74.3	62.3	61.1
2 years or more	84.4	88.2	1,150	900	78.7	77.9	66.4	68.7
BPS:04/09 interview respondents								
Total	83.5	80.0	18,540	15,160	81.8	80.2	68.3	64.1
Public								
Less-than-2-year	76.6	74.3	540	420	77.0	77.5	59.0	57.6
2-year	85.4	77.6	6,310	5,010	79.4	78.1	67.8	60.6
4-year non-doctorate-granting	85.1	70.3	1,690	1,430	84.6	82.6	72.0	58.1
4-year doctorate-granting	86.3	87.1	3,070	2,720	88.4	87.2	76.3	76.0
Private nonprofit								
Less-than-4-year	89.0	92.6	530	400	75.7	79.9	67.4	74.0
4-year non-doctorate-granting	81.9	78.1	2,280	1,990	87.2	84.2	71.4	65.8
4-year doctorate-granting	77.7	80.8	1,520	1,340	88.4	86.8	68.7	70.1
Private for-profit								
Less-than-2-year	84.0	82.3	1,450	1,030	70.8	70.6	59.5	58.1
2 years or more	84.4	88.2	1,150	830	72.5	72.2	61.2	63.6
BPS:04/09 panel respondents								
Total	83.5	80.0	18,540	16,120	87.0	85.7	72.6	68.6
Public								
Less-than-2-year	76.6	74.3	540	380	70.6	71.3	54.0	53.0
2-year	85.4	77.6	6,310	5,360	85.0	83.6	72.6	64.9
4-year non-doctorate-granting	85.1	70.3	1,690	1,560	92.7	91.7	78.9	64.5
4-year doctorate-granting	86.3	87.1	3,070	2,950	95.9	95.0	82.7	82.7
Private nonprofit								
Less-than-4-year	89.0	92.6	530	420	78.7	80.3	70.1	74.3
4-year non-doctorate-granting	81.9	78.1	2,280	2,170	95.0	92.1	77.8	71.9
4-year doctorate-granting	77.7	80.8	1,520	1,480	97.0	96.5	75.4	78.0
Private for-profit								
Less-than-2-year	84.0	82.3	1,450	950	65.8	64.6	55.3	53.2
2 years or more	84.4	88.2	1,150	860	74.7	74.4	63.0	65.6
BPS:04/09 transcript respondents								
Total	83.5	80.0	18,540	16,960	91.5	91.4	76.4	73.1
Public								
Less-than-2-year	76.6	74.3	540	400	74.8	74.7	57.3	55.5
2-year	85.4	77.6	6,310	5,840	92.6	91.7	79.0	71.1
4-year non-doctorate-granting	85.1	70.3	1,690	1,540	91.0	90.4	77.5	63.6
4-year doctorate-granting	86.3	87.1	3,070	2,940	95.7	95.9	82.6	83.6

See notes at end of table.

Table 45. Unweighted and weighted NPSAS:04 institution response rates and BPS:04/09 student study, interview, panel, and transcript response rates, by type of institution: 2009—Continued

Type of institution (base year)	Institution response rate		Eligible sample size		Response rate		Overall response rate	
	Un-weighted	Weighted			Un-weighted	Weighted	Un-weighted	Weighted
Private nonprofit								
Less-than-4-year	89.0	92.6	530	480	90.0	89.0	80.1	82.4
4-year non-doctorate-granting	81.9	78.1	2,280	2,210	96.8	96.9	79.3	75.7
4-year doctorate-granting	77.7	80.8	1,520	1,440	94.5	95.1	73.5	76.9
Private for-profit								
Less-than-2-year	84.0	82.3	1,450	1,080	74.3	74.0	62.4	60.9
2 years or more	84.4	88.2	1,150	1,030	90.0	89.7	75.9	79.2

NOTE: Detail may not sum to totals because of rounding. Base-year institution response rates were obtained from the 2003–04 National Postsecondary Student Aid Study (NPSAS:04) Methodology Report (Cominole et al. 2006, table 8, p. 48). Overall response rates are the product of the NPSAS:04 and BPS:04/09 response rates.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

The institution-level response rates shown in table 45 are the percentage of institutions that provided sufficient data to select the NPSAS:04 student-level sample; these rates are presented and discussed in the NPSAS:04 Full-scale Methodology Report (Cominole et al. 2006, table 8, p. 48). Only the weighted response rates can be interpreted as estimates of the proportion of the BPS:04/09 population that is directly represented by the respondents.

Table 45 shows that, across all types of institutions, 89 percent of the eligible BPS:04/09 sample were study respondents. The rate varied from 74 percent to 97 percent, by type of institution. The overall weighted response rate, incorporating the NPSAS:04 base-year institution response rate, was 71 percent. The study analysis weight described in section 6.1 (WTA000) was developed to compensate for the potentially biasing effects of study nonresponse.

This table also shows that approximately 80 percent of the eligible sample responded to the BPS:04/09 interview. All of the study respondents, including those who did not respond to the interview, have enrollment data from either the student interview or another source, such as their transcript data or the National Student Clearinghouse (NSC) StudentTracker. Enrollment data account for about half of the BPS:04/09 data, and imputation was used to compensate for nonresponse for the remaining items for those study respondents who did not provide interview data. A separate weight for analyzing interview respondents is not provided because imputation was used to reduce nonresponse bias due to interview nonresponse. The weighted response rate for those providing interviews was 80 percent and varied from 71 percent to 87 percent, by type of institution. These interview rates are provided for users of the data who may wish to analyze the cases without imputed data. A related bias analysis is provided in section 6.4.2.

Overall, 86 percent of the sample were panel respondents. To be a panel respondent, the student needed to have sufficient data from either the interview or another source at NPSAS:04, have enrollment data from either the BPS:04/06 interview or another source, and have enrollment data from either the BPS:04/09 interviewer or another source. This rate varied, by type of institution, from 65 percent to 97 percent. The weight variable WTB000 was developed for analyzing the NPSAS:04-BPS:04/06-BPS:04/09 panel respondents.

Table 45 also provides weighted response rates for the transcript data collection component. Overall, at least one transcript was collected from 91 percent of the eligible students.

This varied, by type of institution, from 74 percent to 97 percent. An analysis weight (the weight variable WTC000) was developed for analyzing students with any transcript data.

Section 6.4.2 analyzes the potential bias due to unit nonresponse and the effect the weight adjustments had in reducing the bias.

6.4 Accuracy of Estimates

The accuracy of survey statistics is affected by both random and nonrandom errors. Random errors reduce the precision of survey estimates, while nonrandom errors result in bias (i.e., estimates that do not converge to the true population parameter as the sample size increases without limit).

The sources of error in a survey are often dichotomized as sampling and nonsampling errors. *Sampling error* refers to the error that occurs because the survey is based on a sample of population members rather than the entire population. All other types of errors are *nonsampling errors*, including survey nonresponse (because of inability to contact sampling members, their refusal to participate in the study, etc.) and *measurement errors*, such as the errors that occur because the intent of survey questions was not clear to the respondent, because the respondent had insufficient knowledge to answer correctly, or because the data were not captured correctly (e.g., because of recording, editing, or data entry errors).

The sampling errors are primarily random errors for well-designed surveys such as NPSAS:04, BPS:04/06, and BPS:04/09. However, nonrandom errors can occur if the sampling frame does not provide complete coverage of the target population. The BPS:04/09 survey instrument and data collection procedures were subjected to thorough development and testing to minimize nonsampling errors because these errors are difficult to quantify and are likely to be nonrandom errors.

In this section, sampling errors and design effects for some BPS:04/09 estimates are presented for a variety of domains; these sampling errors and design effects are computed using each of the analysis weights that was constructed for analyzing the BPS:04/09 student and transcript data.

Next, the results of analyses comparing BPS:04/09 nonrespondents and respondents using characteristics known for both nonrespondents and respondents are presented. An analysis of nonresponse bias is presented at both the student level and the item level.

6.4.1 Measures of Precision: Standard Errors and Design Effects

The survey design effect for a statistic is defined as the ratio of the design-based variance estimate divided by the variance estimate that would have been obtained from a simple random sample of the same size. The design effect is often used to measure the effects that sample design features have on the precision of survey estimates. For example, stratification tends to decrease the variance, but multistage sampling and unequal sampling rates usually increase the variance. Weight adjustments for nonresponse (performed to reduce nonresponse bias) and calibration often increase the variance because they can increase the weight variation. Because of these factors, estimates from most complex multistage sampling designs such as BPS:04/09 have design effects greater than 1.0. That is, the design-based variance is larger than the simple random sample variance.

Specifically, the survey design effect for a given estimate, $\hat{\theta}$, is defined as

$$Deff(\hat{\theta}) = \frac{Var_{design}(\hat{\theta})}{Var_{srs}(\hat{\theta})}.$$

The square root of the design effect can also be expressed as the ratio of the standard errors, or

$$Deft(\hat{\theta}) = \frac{SE_{design}(\hat{\theta})}{SE_{srs}(\hat{\theta})}.$$

In appendix L, design effect estimates are presented for important survey domains to summarize the effects of stratification, multistage sampling, unequal probabilities of selection, and the weight adjustments. These design effects were estimated using SUDAAN and the bootstrap variance estimation procedure described in section 6.2.2. If an analysis of BPS:04/09 data must be performed without using one of the software packages for analysis of complex survey data, the design effect tables in appendix L can be used to make approximate adjustments to the standard errors of survey statistics computed using the standard software packages that assume simple random sampling designs.

Large design effects imply large standard errors and relatively poor precision. Small design effects imply small standard errors and good precision. In general terms, a design effect under 2.0 is low, 2.0 to 3.0 is moderate, and above 3.0 is high. Moderate and high design effects often occur in complex surveys such as BPS:04/09, and the design effects in appendix L are consistent with those in past BPS studies. Unequal weighting causes large design effects and is often as a result of nonresponse and poststratification adjustments. However, in BPS:04/09 (as in BPS:04/06 and NPSAS:04), the unequal weighting is also due to the sample design, different sampling rates between institution strata, different sampling rates between student strata, and subsampling of the nonrespondents that were included in BPS:04/06.

6.4.2 Measure of Bias

The bias in an estimated mean based on respondents, \bar{y}_R , is the difference between this mean and the target parameter, π , that is, the mean that would be estimated if a complete census of the target population was conducted and everyone responded. This bias can be expressed as follows, where $E(\bar{y}_R)$ is the expected value of the mean based on respondents over repeated samples:

$$B(\bar{y}_R) = E(\bar{y}_R) - \pi.$$

The estimated mean based on nonrespondents, \bar{y}_{NR} , can be computed if data for the particular variable are available for most of the nonrespondents. The true target parameter, π , can be estimated for these variables as follows:

$$\hat{\pi} = (1 - \eta)\bar{y}_R + \eta\bar{y}_{NR},$$

where η is the weighted unit (or item) nonresponse rate. For the variables that are from the frame, rather than from the sample, π can be estimated without sampling error. The bias can then be estimated as follows:

$$\hat{B}(\bar{y}_R) = \bar{y}_R - \hat{\pi}$$

or, equivalently,

$$\hat{B}(\bar{y}_R) = \eta(\bar{y}_R - \bar{y}_{NR}).$$

This formula shows that the estimate of the nonresponse bias is the difference between the mean for respondents and nonrespondents multiplied by the weighted nonresponse rate.

Nonresponse bias analysis was conducted when the response rate at any level (institutions, students, items) was below 85 percent.²² Institution nonresponse bias was performed as a part of NPSAS:04 and is described in the NPSAS:04 Full-scale Methodology Report (Cominole et al. 2006). A student nonresponse bias analysis and an item nonresponse bias analysis were also performed for BPS:04/06. The remainder of this section summarizes the unit and item nonresponse analyses that were conducted for BPS:04/09.

Unit nonresponse bias analysis and relative bias. Unit nonresponse bias analyses were conducted for the following sets of respondents:

- BPS:04/09 study respondents versus the full set of cases eligible for BPS:04/09 (study respondents and study nonrespondents), before and after the weight adjustment that resulted in the BPS:04/09 study weight (WTA000);
- BPS:04/09 interview respondents versus the full set of cases eligible for BPS:04/09 (interview respondents and interview nonrespondents), using both the BPS:04/06 weight and the BPS:04/09 study analysis weight (WTA000);
- panel respondents (i.e., cases who were study respondents to all three of NPSAS:04, BPS:04/06, and BPS:04/09) versus the full set of cases eligible for BPS:04/09 (panel respondents and cases included in the sample who were not study respondents to all three waves), using the BPS:04/06 weight and then again using the panel weight WTB000; and
- transcript respondents versus the full set of cases eligible for BPS:04/09 (transcript respondents and transcript nonrespondents), before and after the transcript weight adjustment that resulted in the BPS:04/09 student transcript weight WTC000.

Tables in appendix M give the estimates for respondents before the weight adjustment, nonrespondents, and the full sample. Estimates are also given for the respondents after weight adjustment. The nonresponse bias was estimated for variables obtained from the sampling frame and from the NPSAS:04 data collection that are known for both respondents and nonrespondents. In all of the tables, the bias was estimated as follows. First, the percentage distribution was obtained for the respondents using the weight.²³ Next, the percentage distribution was obtained for the overall sample using the BPS:04/06 analysis weight. Then, the bias was estimated as the difference in the percentages. Statistical tests of the bias were also computed using bootstrap estimates of the standard errors, and the tables in appendix M indicate when the bias is statistically different from zero.

²² See *NCES Statistical Standards* (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics 2003) for a discussion of nonresponse bias analysis.

²³ For categorical variables, the \bar{y} bars in the equations are the weighted percentages in each category of the variables (for example, for the gender variable, the \bar{y} bars are the percentage that are male, or the percentage that are female).

It is also informative to compare the distributions of the respondents and nonrespondents, and the tables in appendix M include columns that give the weighted distributions of respondents and nonrespondents. From the above formulas, the bias prior to the weight adjustment can also be obtained as the nonresponse rate multiplied by the difference between respondents and nonrespondents. When the bias before the weight adjustment is statistically significant, the differences between the respondent and nonrespondent distributions are almost always statistically significant. Similarly, when the differences between the respondent and nonrespondent distributions are statistically significant, the bias is also statistically significant. When one is statistically significant but not the other, the p values are very close to .05. The p values are not identical because of the sampling error associated with the nonresponse rate. For this reason, separate columns that give statistical tests are not provided in appendix M for comparing the respondent and nonrespondent percentages.

The variables (and number of categories of each variable) that were used in the analyses for all sample members are the following:

- type of institution in the base year (9 categories);
- region (9 categories);
- Central Processing System (CPS) match at the base year (yes/no) (2 categories);
- applied for federal aid (yes/no) (2 categories),
- Pell Grant recipient (yes/no) (2 categories);
- total Pell Grant amount received (4 categories);
- Stafford Loan recipient (yes/no) (2 categories);
- total Stafford Loan amount received (4 categories);
- base-year institution undergraduate enrollment (5 categories)
- age at base year (5 categories);
- high school graduation year (4 categories);
- dependency status at base year (2 categories);
- income level at base year (15 categories);
- race/ethnicity (5 categories);
- gender (2 categories);
- marital status at base year (3 categories); and
- citizenship status at base year (3 categories).

The nonresponse bias was estimated for the above variables and tested to determine if the bias was significant at the 5 percent level. The tests are reported to be statistically significant if the p value is less than .05. Results are given in appendix M for all institutions combined and by type of institution.

Table 46 summarizes the results of the bias analysis for study respondents. This analysis estimated the bias prior to the weight adjustment using the BPS:04/06 weight or, equivalently, compared the BPS:04/09 study respondents and study nonrespondents. Tables in appendix M give the estimated bias before and after the weight adjustment that resulted in the study analysis weight WTA000. Appendix M also contains tables for all students and for each of the nine institution types.

Table 46. Summary of student study nonresponse bias before and after weight adjustments, by type of institution: 2009

Type of institution	Nonresponse bias statistics				Significant variable categories	
	Mean	Median	Minimum	Maximum	Percent	Number
Total						
Before weight adjustments	0.62	0.43	0.00	2.85	67.9	53
After weight adjustments	0.05	0.02	0.00	0.32	1.3	1
Public less-than-2-year						
Before weight adjustments	0.82	0.40	0.02	4.14	11.8	8
After weight adjustments	0.95	0.47	0.01	4.61	13.2	9
Public 2-year						
Before weight adjustments	0.30	0.17	0.00	1.46	24.6	17
After weight adjustments	0.14	0.11	0.00	0.62	2.9	2
Public 4-year non-doctorate-granting						
Before weight adjustments	0.40	0.26	0.01	1.87	14.7	10
After weight adjustments	0.23	0.22	0.00	0.71	0.0	0
Public 4-year doctorate-granting						
Before weight adjustments	0.24	0.20	0.00	1.01	35.8	24
After weight adjustments	0.13	0.09	0.00	0.45	0.0	0
Private nonprofit less-than-4-year						
Before weight adjustments	0.57	0.49	0.00	2.12	0.0	0
After weight adjustments	0.64	0.38	0.00	2.32	0.0	0
Private nonprofit 4-year non-doctorate-granting						
Before weight adjustments	0.49	0.32	0.00	1.90	30.4	21
After weight adjustments	0.24	0.23	0.01	0.81	0.0	0
Private nonprofit 4-year doctorate-granting						
Before weight adjustments	0.17	0.09	0.00	0.74	13.0	9
After weight adjustments	0.14	0.11	0.00	0.72	0.0	0
Private for-profit less-than-2-year						
Before weight adjustments	0.77	0.63	0.01	3.68	23.2	16
After weight adjustments	0.40	0.28	0.01	1.61	5.8	4
Private for-profit 2 years or more						
Before weight adjustments	0.72	0.45	0.01	2.99	2.9	2
After weight adjustments	0.75	0.48	0.01	3.12	2.9	2

NOTE: The statistics "before weight adjustments" were based on using the BPS:04/06 analysis weight. The statistics "after weight adjustments" were based on using the BPS:04/09 study weight WTA000. The percents are based on the total number of variable categories that have nonzero respondents and nonrespondents (usually 78 for the total and 69 by type of institution).SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

The *NCES Statistical Standards* (U.S. Department of Education [ED], Institute of Education Sciences [IES], National Center for Education Statistics [NCES] 2003) requires a bias analysis for any stage of a sample with a response rate less than 85 percent. From table 45, the weighted BPS:04/09 study response rate was less than 85 percent for students whose base-year institution was public less-than-2-year, private for-profit less-than-2-year, and private for-profit 2 years or more. Table 46 shows that the bias was generally reduced across all of the types of institutions. In particular, for students in the private for-profit less-than-2-year institutions, 23 percent of the variable categories had statistically significant bias before the weight adjustment, and 6 percent had statistically significant bias after the weight adjustment. For students in the private for-profit 2 years or more institutions, the percent of the variable categories with statistically significant bias was the same before and after weight adjustment (3 percent). One exception is for students in the public less-than-2-year institutions, where the percentage of variable categories with statistically significant bias increased from 12 percent to 13 percent using the adjusted weight. This type of institution has a relatively small sample size, however, and the actual bias in the variables remained about the same.

An analysis of bias was also conducted for the interview respondents. As noted earlier, some cases classified as study respondents have enrollment data from sources other than the BPS:04/09 interview, but do not have BPS:04/09 interview data. The BPS:04/09 data file contains imputed variables for the interview data and some derived variables for those study respondents who were interview respondents. Stochastic imputation was used to reduce the bias due to interview nonresponse. A separate analysis weight was not constructed that adjusted solely for the BPS:04/09 interview nonresponse. However, for users who might consider analyzing only the nonimputed data using the BPS:04/09 study weight, an analysis of the potential bias was conducted.

Tables in appendix M compare BPS:04/09 interview respondents and nonrespondents, using the BPS:04/09 study weight. From table 45, the student interview response rates are less than 85 percent for the full sample, and for students in all types of institutions except the public 4-year doctorate-granting and the private nonprofit 4-year doctorate-granting. Table 47 summarizes the bias among interview respondents using the BPS:04/06 weight and also using the BPS:04/09 study weight. The percentage of variable categories with statistically significant bias is usually smaller when the BPS:04/09 student study weight is used for analysis compared to when the BPS:04/06 analysis weight is used. Exceptions are the public less-than-2-year institutions, the public 2-year institutions, and the private for-profit 2 years or more institutions. For these types of institutions, the actual bias is fairly similar using the two weights. This analysis indicates that the preferred weight for the data users who wish to analyze the interview respondents with nonimputed data is the BPS:04/09 study weight. However, users of the data should be aware that the adjustments applied to develop the study weight do not adjust for all of the interview nonresponse and some biases may still exist in the estimates. The actual estimated biases are all less than 5 percent for the variables considered in this analysis. However, across all types of institutions, almost one-third of the variable categories have statistically significant bias when the study weight is used for analyzing the interview respondents.

Table 47. Summary of student nonresponse bias for interview respondents when analyzed using the study weight, by type of institution: 2009

Type of institution	Nonresponse bias statistics				Significant variable categories	
	Mean	Median	Minimum	Maximum	Percent	Number
Total						
Using BPS:04/06 weight	0.58	0.40	0.00	2.31	57.7	45
Using BPS:04/09 study weight	0.25	0.18	0.00	0.88	32.1	25
Public less-than-2-year						
Using BPS:04/06 weight	0.91	0.44	0.03	4.24	8.8	6
Using BPS:04/09 study weight	1.03	0.57	0.00	4.60	19.1	13
Public 2-year						
Using BPS:04/06 weight	0.32	0.19	0.00	1.62	13.0	9
Using BPS:04/09 study weight	0.34	0.24	0.00	1.29	17.4	12
Public 4-year non-doctorate-granting						
Using BPS:04/06 weight	0.59	0.38	0.01	2.03	16.2	11
Using BPS:04/09 study weight	0.38	0.30	0.00	1.22	4.4	3
Public 4-year doctorate-granting						
Using BPS:04/06 weight	0.42	0.31	0.01	1.40	26.9	18
Using BPS:04/09 study weight	0.30	0.24	0.01	0.93	6.0	4
Private nonprofit less-than-4-year						
Using BPS:04/06 weight	0.72	0.63	0.07	2.65	0.0	0
Using BPS:04/09 study weight	0.88	0.47	0.01	3.93	0.0	0
Private nonprofit 4-year non-doctorate-granting						
Using BPS:04/06 weight	0.83	0.56	0.01	3.17	37.7	26
Using BPS:04/09 study weight	0.48	0.34	0.02	2.15	8.7	6
Private nonprofit 4-year doctorate-granting						
Using BPS:04/06 weight	0.41	0.19	0.00	2.37	11.6	8
Using BPS:04/09 study weight	0.38	0.26	0.00	1.71	1.4	1
Private for-profit less-than-2-year						
Using BPS:04/06 weight	0.69	0.54	0.01	2.93	21.7	15
Using BPS:04/09 study weight	0.52	0.35	0.01	1.94	5.8	4
Private for-profit 2 years or more						
Using BPS:04/06 weight	0.57	0.37	0.01	3.00	0.0	0
Using BPS:04/09 study weight	0.77	0.50	0.01	3.29	2.9	2

The percents are based on the total number of variable categories that have nonzero respondents and nonrespondents (usually 78 for the total and 69 by type of institution).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

An analysis was also conducted to compare the panel respondents and panel nonrespondents and to see if significant bias remains after the weight adjustment that resulted in the longitudinal or panel weight WTB000. From table 45, students in the following types of institutions had panel response rates less than 85 percent: public less-than-2-year, public 2-year, private nonprofit less-than-4-year, private for-profit less-than-2-year, and private for-profit 2 years or more. Tables in appendix M give detailed results of the analysis for each type of institution. The summary in table 48 shows that, prior to weight adjustment, nonresponse bias was significant for 72 percent of the variable categories and, after weight adjustment, was significant for 5 percent of the variable categories. The weight adjustments resulted in a reduction of bias across all institution

types, except for students in private for-profit 2-year or more institutions where 3 percent of the variable categories had statistically significant bias before and after the weight adjustment and in private nonprofit less-than-4-year institutions where none of the variable categories had statistically significant bias before and after weight adjustment.

Table 48. Summary of student NPSAS:04-BPS:04/06-BPS:04/09 nonresponse bias, by type of institution: 2009

Type of institution	Nonresponse bias statistics				Significant variable categories	
	Mean	Median	Minimum	Maximum	Percent	Number
Total						
Before weight adjustments	0.78	0.55	0.02	3.92	71.8	56
After weight adjustments	0.07	0.02	0.00	0.51	5.1	4
Public less-than-2-year						
Before weight adjustments	0.95	0.64	0.04	4.25	7.4	5
After weight adjustments	0.94	0.61	0.02	4.25	5.9	4
Public 2-year						
Before weight adjustments	0.45	0.27	0.00	2.28	34.8	24
After weight adjustments	0.21	0.17	0.00	0.92	4.3	3
Public 4-year non-doctorate-granting						
Before weight adjustments	0.49	0.36	0.01	2.36	19.1	13
After weight adjustments	0.35	0.26	0.00	1.34	5.9	4
Public 4-year doctorate-granting						
Before weight adjustments	0.32	0.21	0.00	1.53	35.8	24
After weight adjustments	0.20	0.15	0.00	0.88	6.0	4
Private nonprofit less-than-4-year						
Before weight adjustments	0.78	0.64	0.01	2.56	0.0	0
After weight adjustments	0.79	0.51	0.02	3.64	0.0	0
Private nonprofit 4-year non-doctorate-granting						
Before weight adjustments	0.80	0.63	0.00	3.55	46.4	32
After weight adjustments	0.39	0.25	0.01	1.43	5.8	4
Private nonprofit 4-year doctorate-granting						
Before weight adjustments	0.26	0.10	0.00	1.06	11.6	8
After weight adjustments	0.27	0.19	0.01	0.98	0.0	0
Private for-profit less-than-2-year						
Before weight adjustments	0.72	0.51	0.00	3.87	13.0	9
After weight adjustments	0.79	0.52	0.01	3.29	11.6	8
Private for-profit 2 years or more						
Before weight adjustments	0.73	0.47	0.02	3.08	2.9	2
After weight adjustments	0.92	0.56	0.01	3.57	2.9	2

NOTE: The statistics "before weight adjustments" were based on using the BPS:04/06 analysis weight. The statistics "after weight adjustments" were based on using the BPS:04/09 panel weight WTB000. The percents are based on the total number of variable categories that have nonzero respondents and nonrespondents (usually 78 for the total and 69 by type of institution).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

From table 45, the percentage of BPS:04/09 students with transcript data was high overall (91 percent) and varied from 74 percent to 97 percent, by type of institution. Transcript data were available for fewer than 85 percent of students whose NPSAS institutions were public less-than-2-

year and private for-profit less-than-2-year. Tables in appendix M give the results of the analysis that compares transcript respondents and nonrespondents. Prior to the adjustment for nonresponse, across all institutions, 41 percent of the variable categories had statistically significant bias prior to the weight adjustment for nonresponse; the percentage was reduced to 4 percent after the adjustment (table 49).

Table 49. Summary of student transcript nonresponse bias, by type of institution: 2009

Type of institution	Nonresponse bias statistics				Significant variable categories	
	Mean	Median	Minimum	Maximum	Percent	Number
Total						
Before weight adjustments	0.37	0.24	0.00	1.42	41.0	32
After weight adjustments	0.05	0.02	0.00	0.42	3.8	3
Public less-than-2-year						
Before weight adjustments	1.40	0.92	0.05	4.77	0.0	0
After weight adjustments	1.81	1.20	0.00	6.31	1.5	1
Public 2-year						
Before weight adjustments	0.31	0.12	0.00	1.23	11.6	8
After weight adjustments	0.20	0.10	0.00	0.88	8.7	6
Public 4-year non-doctorate-granting						
Before weight adjustments	0.39	0.23	0.01	1.52	10.3	7
After weight adjustments	0.41	0.28	0.00	2.18	1.5	1
Public 4-year doctorate-granting						
Before weight adjustments	0.16	0.07	0.00	1.04	23.9	16
After weight adjustments	0.13	0.07	0.00	0.58	3.0	2
Private nonprofit less-than-4-year						
Before weight adjustments	1.16	0.81	0.01	3.46	1.4	1
After weight adjustments	0.75	0.60	0.01	4.14	0.0	0
Private nonprofit 4-year non-doctorate-granting						
Before weight adjustments	0.25	0.16	0.00	1.49	2.9	2
After weight adjustments	0.30	0.19	0.00	1.68	0.0	0
Private nonprofit 4-year doctorate-granting						
Before weight adjustments	0.24	0.14	0.00	1.18	21.7	15
After weight adjustments	0.16	0.09	0.00	1.40	1.4	1
Private for-profit less-than-2-year						
Before weight adjustments	0.68	0.33	0.00	6.53	18.8	13
After weight adjustments	0.74	0.48	0.01	3.75	18.8	13
Private for-profit 2-year-or-more						
Before weight adjustments	0.46	0.31	0.00	2.89	2.9	2
After weight adjustments	0.48	0.34	0.00	2.49	1.4	1

NOTE: the statistics "before weight adjustments" were based on using the BPS:04/06 analysis weight. The statistics "after weight adjustments" were based on using the weight for analyzing the BPS:04/09 students with a transcript, WTC000. The percents are based on the total number of variable categories that have nonzero respondents and nonrespondents (usually 78 for the total and 69 by type of institution).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09).

Item nonresponse bias analysis. When item response rates were less than 85 percent, the NCES Statistical Standards required that a nonresponse bias analysis be conducted. This analysis

was conducted on the data items collected in the BPS:04/09 interview based on study respondents and for variables derived from student transcript data collection. As shown in the equation below, item response rates (RRI) are calculated as the ratio of the number of respondents for whom an in-scope response was obtained (I^x for item x) to the number of respondents who are asked to answer that item. The number asked to answer an item is the number of unit-level respondents (I) minus the number of respondents with a valid skip for item x (V^x). When an abbreviated questionnaire is used to convert refusals, the eliminated questions are treated as item nonresponse (ED, IES, NCES 2003):

$$RRI^x = I^x \div (I - V^x).$$

Item response rates were computed using nonimputed data. Valid skips were later logically imputed to the follow-up items after the gate question was imputed (but these imputed skips count as missing for computing the response rate). Table J-1 in appendix J lists the items from the BPS:04/09 interview along with the number of cases who were eligible to answer each item, and the weighted item response rates and nonresponse rates. The BPS:04/09 study weight ($WTA000$) was used to calculate the response rates. The nonresponse rate was also the same as the percentage of cases for which the item was imputed. The denominator of the item response rate included cases who were study respondents but who did not respond to the BPS:04/09 interview. As mentioned earlier, cases who did not respond to a gate item were treated as missing for the items within the gate. All but five of the 168 items listed in table J-1 had item response rate less than 85 percent. These five items with response rate greater than 85 percent were GRENR09 (Current attendance in graduate school), SATMAJ09 (Satisfaction with choice of major), SEROLE09 (Primary role while working), SPSBOR09 (Spouse's total student loan amount), and VOTEVE09 (Ever voted in a U.S. election).

Table J-4 lists the derived variables from the transcript data along with the number of eligible cases and the weighted item response rates and nonresponse rates. The BPS:04/09 student transcript analysis weight ($WTC000$) was used to calculate the response rates. Of the 362 variables, all but 26 had a response rate greater than 85 percent.

A nonresponse bias analysis was conducted for items with a weighted response rate less than 85 percent for all BPS:04/09 study respondents, and for derived transcript variables with weighted response rates less than 85 percent. The possibility of estimating the degree of bias depends on having some variables that reflect key characteristics of respondents and for which there is little or no missing data. The variables that were used (from the bulleted list above) are known for all BPS:04/09 study respondents. These variables are important to the study and are related to many of the items being analyzed for low item response rates. For the items with a weighted response rate less than 85 percent, the nonresponse bias prior to imputation was estimated for each of these characteristics that are known for respondents.

Table M-41 in appendix M illustrates the estimated bias (prior to item imputation) for one item (GPA09 – Estimate of GPA) for BPS:04/09 study respondents. Similar computations were performed and tabulations were produced for each of the items. Table M-42 summarizes the results of the item nonresponse bias analysis for each of the items from the student interview, and gives the mean and median bias, the mean and median relative bias, and the percentage of the variables categories with statistically significant bias. Across the items, the percentage of variables with statistically significant bias ranged from 4 percent to 70 percent. Table M-43 gives the same analysis for the derived transcript items that have a weighted item response rate less than 85 percent.

Item imputation was used to fill in missing data for BPS:04/09 interview respondents and nonrespondents, as described in chapter 5. Item imputation was expected to reduce the bias due to item nonresponse, and was used instead of a separate weight adjustment for nonresponse for each item. All of the questionnaire items that are listed in table J-1 were imputed using the imputation process described in chapter 5.

A by-product of imputation was the reduction or elimination of item-level nonresponse bias. While item-level bias before imputation was measurable, after imputation it was not. As a result, how well an imputation procedure worked in reducing bias could not be directly evaluated. Instead, the before- and after-imputation item estimates were compared to determine whether the imputation significantly changed the biased estimates, thus suggesting a reduction in bias. Weighted estimates were computed using the nonimputed data (including only those cases who responded to the item) and also using the imputed data (including cases who responded to the item and also cases with imputed data for the item). Table J-2 gives the means before and after imputation for the continuous variables, and table J-3 gives the distributions before and after imputation for the categorical variables. These tables also give the difference between the pre-imputation and post-imputation estimates. The difference between the pre-and post-imputation estimates was statistically significant for 17 percent of the variables and variable categories. This suggests that imputation was only slightly successful in reducing the bias due to item nonresponse.

Imputation was not performed for the items obtained from student transcript data. A weight, adjusted for students without any transcript data, was computed. Most of the variables that were derived from the transcript data have high item response rates (table J-4).

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